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STUDIES

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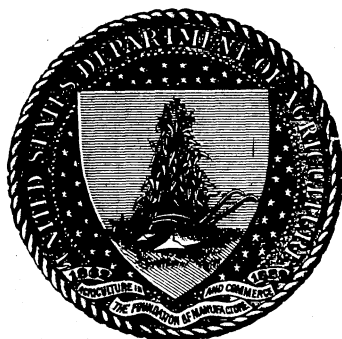
AMERICAN GRASSES.

THE NORTH AMERICAN SPECIES  
OF CHÆTOCHLOA.

BY

F. LAMSON-SCRIBNER and ELMER D. MERRILL.

ISSUED MARCH 8, 1900.



WASHINGTON:  
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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
DIVISION OF AGROSTOLOGY,  
*Washington, D. C., January 15, 1900.*

SIR: I have the honor to transmit herewith and recommend for publication as Bulletin No. 21 of this Division, and under the general title of "Studies on American Grasses," a revision of the North American species of *Chaetochloa*.

In our manuals of the plants of the northern United States four species of *Chaetochloa* are described, all introduced, three being common weeds, the fourth an occasional escape from cultivation. In Chapman's Southern Flora two additional and presumably native species are enumerated. In the paper here presented 28 North American species are described, 23 of which are natives of this continent. Six of the species enumerated are published here for the first time.

Acknowledgments are due Dr. B. L. Robinson, curator of the Gray Herbarium, for the loan of specimens and assistance in looking up authorities, etc., and to J. H. Burchell, of the Kew Herbarium, for assistance in the determinations by making comparisons with type material.

Respectfully,

F. LAMSON-SCRIBNER,  
*Agrostologist.*

HON. JAMES WILSON,  
*Secretary of Agriculture.*



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## THE NORTH AMERICAN SPECIES OF CHÆTOCHLOA.

### INTRODUCTION.

The North American species of *Chætochloa* have long been unsatisfactorily identified, and the present revision is offered in the hope of clearing up much of the existing confusion in this genus. It was at first proposed to consider only those species native of or introduced into the United States, but as the Mexican and West Indian species were found to be in an even more unsatisfactory condition than those of the United States, it seemed advisable to include such of these species as were represented in the material at hand.

In North America there are 28 species of *Chætochloa*, 6 of which are here published for the first time. Of these 28 species, 23 are native of North America, the remaining 5 having been introduced from Europe, of which 3 are cosmopolitan weeds found in the temperate regions of both hemispheres.

From an economic standpoint the genus takes high rank through the extensive cultivation of *C. italica*, various forms of which, under the names of millet, Hungarian grass, etc., are widely cultivated in this country as soiling or forage crops, and are among the oldest cultivated crops of the world, record having been found of its cultivation in China as early as 2700 B. C. In Europe its cultivation dates from prehistoric times, as the grain is found in abundance in the débris of the Lake Dwellings of the Stone Age in Switzerland.

The species are for the most part readily distinguished, except in the group represented by *C. imberbis*, which is extremely variable and is found in the warmer regions in both hemispheres. In general the details of the spikelets in this group are very similar, the variation being chiefly in the length and color of the panicles and setæ and in the vegetative characters. *C. gracilis* and *C. purpurascens* are here recognized as valid species, as they have certain constant characters by which they can be readily distinguished from related species. *C. macrostachya*, originally described from Mexican material and since credited to Asia and Australia, is confined to America, the Asiatic forms referred to this species are now referred to *CHÆTOCHLOA FORBESIANA* (Nees) n. comb. (*Panicum forbesianum* Nees) and the Australian form, which is very distinct from *C. macrostachya*, is here proposed as a new species. *C. composita*, a common southwestern

grass, has long been referred by botanists to *C. caudata* and *C. setosa*, from both of which it is very distinct.

"The name *Setaria*, which has been taken up by many botanists for a number of well-known weedy grasses with dense, spike-like, bristly panicles, was first applied by Beauvois (Flora Oware et Benin.) to a species of *Pennisetum*. At an earlier date the name was employed by Acharius to designate a genus of lichens. According to all rules of botanical nomenclature, this last fact renders the name untenable for designating a genus of flowering plants; and were this not the case, its first application to a species of *Pennisetum* placed it at once among the synonyms, which, according to recent rulings, would debar its further use. Some botanists have referred the grasses in question to the genus *Panicum*, from the species of which they differ only in the presence of setæ issuing from the pedicels of the spikelets below their articulation. It is this character, combined with their inflorescence, which led them to be separated from *Panicum*, in which genus the earlier described species were first placed. The taking up of the name *Chamæraphis*, a genus established by R. Brown upon certain Australian and south Asiatic grasses having spikelets like those of *Panicum*, but with the partial rachis of the inflorescence produced into long awn-like points beyond the insertion of the upper or only spikelet, appears to have been ill advised, and the more recent adoption of *Ixophorus* for *Setaria* is equally so. The latter genus, *Ixophorus*,<sup>1</sup> possesses well-marked characters of generic value, and the same is true of *Chamæraphis*. Neither of these names can be taken up for *Setaria*, unless they are used in a very broad sense to include all the species of *Panicum* thrown by Steudel into the section *Setaria*; that is, those species, as Schlechtendal states it, having "*spicula in axibus inflorescentiæ variæ evolutis pedicellatæ sessilesve, axium sterilium, setas æmulantium majore minoreve copia cum spiculis nascente.*" This would bring together a heterogeneous assemblage of species, the natural result of the adoption of characters too artificial, which, with our present ideas of genera, would be much more easily and more systematically treated if divided into genera upon more natural and genetic characters. While our *Setarias*, so called, might, under a broad conception of the genus *Panicum*, be referred to it, they seem to form a well-marked group, as indicated by the characters noted above, which it seems best to maintain as a genus, under the new name *Chaetochloa*."<sup>2</sup>

**CHÆTOCHLOA** Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 38 (1897). *Setaria* Beauv. Agrost. 113 (1812), in part, not Fl. Oware et Benin. 2: 80 (1807), nor Acharius (1798). *Chamæraphis* Kuntze in part, not R. Br. *Ixophorus* Nash (1895), not Schlecht. (1861-62).

<sup>1</sup> Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 1. (1897.)

<sup>2</sup> Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 38. (1897.)



Spikelets hermaphrodite, usually 1-flowered. Glumes 4, the outer 3 membranous, the third often subtending a hyaline palea and rarely a staminate flower, the fourth or flowering glume chartaceous, smooth or transversely rugose, inclosing a palea of similar texture. Stamens 3. Styles distinct, elongated; setae persistent, single or in clusters below the articulation of the rachilla; stigmas plumose. Grain free, inclosed within the glumes and palea.

Annual or perennial grasses with erect culms, flat leaves, and dense, cylindrical, or somewhat open bristly panicles.

Species about 40 in the tropical and more temperate regions of both hemispheres.

#### ANALYTICAL KEY TO THE SPECIES.

1. Setae 5 to 16 at the base of each spikelet, involucrate ..... 2
1. Setae 1 to 3 at the base of each spikelet, not involucrate ..... 5
2. Annual; setae short, tawny-yellow ..... 1 *C. glauca*.
2. Perennial, from short creeping rootstocks ..... 3
3. Setae short, once or twice as long as the spikelets; panicles slender ..... 4
3. Setae generally elongated, spreading; panicles thick ..... 2 *C. imberbis*.
  - (a) Setae very long, yellow or purple ..... var. *penicillata*.
  - (b) Plants not caespitose; culms naked and wiry at the base; spikelets purplish ..... var. *perennis*.
  - (c) Plants robust, glaucous; culms erect; leaves long, rigid, erect; panicles pale green, elongated ..... var. *streptobotrys*.
  - (d) Plants robust; culms geniculate; panicles 6 to 12 cm. long, yellowish ..... var. *geniculata*.
4. Leaves narrow, linear, elongated; panicle very slender, pale .... 4 *C. gracilis*.
4. Leaves linear-lanceolate, short; panicle thicker, usually purplish ..... 3 *C. purpurascens*.
5. Second glume equaling the flowering glume in length ..... 6
5. Second glume shorter than the flowering glume ..... 15
6. Setae antrorsely scabrous ..... 7
6. Setae retrorsely scabrous, wholly or in part ..... 13
7. Flowering glume strongly transversely undulate-rugose ..... 12 *C. longipila*.
7. Flowering glume smooth, or at least only punctate or striate, not rugose ..... 8
8. Panicle dense, cylindrical; branches short, approximate, densely flowered .... 9
8. Panicle lax; branches remote, generally elongated, few-flowered ..... 12
9. Flowering glume very smooth, glossy; plants robust, 18 to 36 dm. high ..... 11 *C. magna*.
9. Flowering glume more or less roughened, not glossy; plants less than 18 dm. high ..... 10
10. Axis of the inflorescence scabrous; branches subverticillate .... 8 *C. ambigua*.
10. Axis of the inflorescence pilose; branches alternate ..... 11
11. Panicles 2 to 8 cm. long, 1 cm. or less thick; spikelets 2 mm. long, much exceeded by the usually green setae ..... 9 *C. viridis*.
11. Panicles 5 to 20 cm. long, 1 to 3 cm. thick; spikelets about 2.3 mm. long, equalled or exceeded by the usually purple setae; cultivated .... 10 *C. italica*.
  - (a) Culms 3 to 9 dm. high; panicle 1 cm. in diameter; setae long, purple, rarely green ..... var. *germanica*.
12. Spikelets 3 mm. long ..... 24 *C. villosissima*.
12. Spikelets 2 mm. long ..... 25 *C. grisebachii*.
13. Setae retrorsely scabrous above, antrorsely scabrous at the base; leaves pubescent ..... 7 *C. scandens*.
13. Setae retrorsely scabrous throughout; leaves scabrous ..... 14
14. Panicles 1.5 to 3 cm. long, 1 cm. thick, purplish ..... 5 *C. brevispica*.

14. Panicles 5 to 18 cm. long, tapering to the obtuse apex, green, rarely purplish ..... 6 *C. verticillata*.
15. Spikelets 3 mm. long..... 16
15. Spikelets less than 3 mm. long..... 18
16. Leaves smooth or scabrous ..... 17
16. Leaves pilose-pubescent..... 24 *C. villosissima*.
17. Leaves lanceolate, 10 to 20 mm. wide; panicle loose; branches elongated, few-flowered..... 23 *C. macrosperma*.
17. Leaves linear, glaucous, 2 to 5 mm. wide; panicle subspiciform; branches densely flowered ..... 18 *C. composita*.
18. Inflorescence spike-like, dense; branches very short, approximate..... 19
18. Inflorescence lax, interrupted; branches more or less elongated..... 24
19. Flowering glume strongly transversely undulate-rugose ..... 20
19. Flowering glume smooth or only finely transversely wrinkled ..... 23
20. Leaves smooth or scabrous..... 13 *C. corrugata*.
- (a) Spikes 5 to 7 cm. long; setæ usually purplish, spreading.. var. *parviflora*.
20. Leaves pubescent or pilose ..... 21
21. Leaves lanceolate, acute, 12 to 15 mm. wide; setæ long..... 21 *C. latifolia*.
- (a) Leaves 10 mm. wide or less; setæ short..... var. *brevisetæ*.
21. Leaves linear or linear-lanceolate, about 5 mm. wide ..... 22
22. Culms pilose with scattered hairs; fertile palea nearly plane.... 15 *C. hispida*.
22. Culms smooth; fertile palea strongly convex ..... 14 *C. gibbosa*.
23. Leaves pilose; plants 2 to 3 dm. high ..... 16 *C. leucopila*.
23. Leaves smooth or scabrous, glaucous; plants robust, 4 to 9 dm. high. .... 18 *C. composita*.
24. Setæ antrorsely and more sparingly retrorsely scabrous..... 17 *C. onurus*.
24. Setæ antrorsely scabrous only..... 25
25. Flowering glume very strongly transversely undulate-rugose..... 26
25. Flowering glume smooth or only finely transversely wrinkled..... 27
26. Leaves and rachis pilose..... 21 *C. latifolia*.
26. Leaves and rachis scabrous ..... 22 *C. liebmanni*.
- (a) Branches of the panicle very short; leaves 1 dm. long or less, 8 to 10 mm. wide..... var. *pauciflora*.
27. Leaves linear..... 28
27. Leaves lanceolate or linear-lanceolate ..... 29
28. Leaves glaucous; panicle pale, obtuse at the apex..... 18 *C. composita*.
28. Leaves pubescent; panicle long-attenuate at the apex ..... 27 *C. caudata*.
29. Panicle subcylindrical; branches densely flowered..... 30
29. Panicle more lax; branches loosely few-flowered..... 31
30. Margins of the sheaths smooth; setæ short ..... 20 *C. rigida*.
30. Margins of the sheaths ciliate-fringed; setæ long, spreading..... 19 *C. macrostachya*.
31. Flowering glume manifestly transversely wrinkled..... 32
31. Flowering glume smooth or only pitted or striate..... 25 *C. grisebachii*.
- (a) Plants densely caespitose, less than 1 dm. high ..... var. *mexicana*.
- (b) Plants robust, 5 to 8 dm. high; branches of the panicle elongated, spreading, the lower ones 2 to 3.5 cm. long ..... var. *ampla*.
32. Panicle long-attenuate at the apex; branches strict, erect; leaves pubescent..... 28 *C. setosa*.
32. Panicle obtuse at the apex; branches spreading; leaves smooth or pilose..... 26 *C. polystachya*.

A. *Setæ* 5 to 16, involucrate.

\*Annual.

1. *Chaetochloa glauca*<sup>1</sup> (L.) Scribn. U. S. Dept. Agr., Div. Agros. Bul 4: 39 (1897). *Panicum glaucum* L. Sp. Pl. 56 (1753). *Setaria glauca* Beauv. Agrost. 51 (1812). *Chameraphis glauca* Kuntze Rev. Gen. Pl. 2: 767 (1891). *Ixophorus glaucus* Nash Bul. Torr. Bot. Club 22: 423 (1895). (Fig. 1.)

An erect or ascending somewhat caespitose, glaucous annual 3 to 12 dm. high, with flat, lanceolate or linear-lanceolate leaves, and dense, bristly, cylindrical, spike-like, yellowish panicles 2 to 10 cm. long. Culms branching at the base, geniculate, compressed, glabrous; nodes brown, smooth; sheaths glabrous, loose, compressed, margins hyaline, smooth; ligules short, ciliate; leaf blades 0.5 to 1.5 dm. long, 4 to 8 mm. wide, long-acuminate, glaucous, nearly glabrous, or scabrous on the upper surface and margins, generally pilose, with scattered long white hairs at the base. Panicles dense, linear-ovate, obtuse, about 1 cm. in diameter; rachis angular, pubescent; setæ involucrate, 5 to 12 at each spikelet, straight, or subflexuous, unequal, antrorsely scabrous, yellow, 3 to 8 mm. long. Spikelets broadly ovate, 3 mm. long, 2 mm. broad, acute or obtuse; first glume one-third to one-half as long as the spikelet, acute, 3-nerved; second glume one-half to two-thirds as long as the spikelet, broadly ovate, acute, 5-nerved, the mid-nerve excurrent, the lateral ones anastomosing with it; third glume 5-nerved, equaling the flowering glume, subtending a broadly-lanceolate, hyaline palea nearly its own length; flowering glume broad-ovate, acute, 2.5 mm. long, striate, transversely undulate-rugose, the inclosed palea broad, convex at the base, concave above, transversely striate.

In waste places and cultivated grounds widely distributed in North America. Naturalized from Europe. July–September.



FIG. 1.—*Chaetochloa glauca*: a, view of the spikelet showing the setæ; b, spikelet showing the first and third glumes.

<sup>1</sup> *CHÆTOCHLOA APICULATA* sp. nov.

An erect, caespitose, perennial (?), 2 to 4 dm. high, with rather rigid leaves, large spikelets, and long, erect setæ. Culms slender, slightly geniculate and generally much branched at the base, glabrous or slightly scabrous; nodes smooth; sheaths

SPECIMENS EXAMINED.—*Ottawa*: Macoun 1884. *Maine*: Rumford, Parlin 1889; Auburn, Merrill 1898. *New Hampshire*: Jaffrey, 284 Robinson 1897. *Massachusetts*: Great Barrington, Pollard 1894; South Hadley, Clark 1887. *Connecticut*: South Glastonbury, 25 Wilson 1892. *New York*: Oxford, Coville 1884; New York, Kenyon 1889. *New Jersey*: Weehawken, Van Sickle 1895. *Pennsylvania*: Conewago, Small; Philadelphia, Smith; Easton, Porter 1896. *Delaware*: 146 Commons 1897. *District of Columbia*: Vasey 1885. *Ohio*: Ricksecker 1894. *Michigan*: Keweenaw Co., 537 Farwell 1886. *Tennessee*: Knoxville, Scribner. *Iowa*: Fayette Co., Fink 1894; Ames, 180 Ball 1896. *Kansas*: Manhattan, Bassler, 1883; Riley Co., 575 Norton 1895. *Missouri*: 266 Eggert 1886. *Wisconsin*: Oshkosh, Random 1896. *South Dakota*: Bellefourche, 366 Griffiths 1897; Redfield, 221 Griffiths 1897; Frankfort, 54 Griffiths 1897. *North Carolina*: Magnetic City, Wetherby 1895. *Alabama*: McCarthy 1888. *Louisiana*: Ascension, 1409 Combs 1898; Rayville, 23a Ball 1898; Calhoun, 44 Ball 1898; Shreveport, 97 Ball 1898.

\*\**Perennial*.

2. *Chaetochloa imberbis* (Poir.) Scribn.; U. S. Dept. Agr., Div. Agros. Bul. 4: 37 (1897). *Panicum imberbe* Poir. Encycl. Suppl. 4: 272 (1817). *Panicum levigatum* Muhl. in Elliott Sk. Bot. S. Car. & Ga. 1: 112 (1817). *Chaetochloa levigata* Scribn. *Chaetochloa perennis* (Curtiss) Bicknell Bul. Torr. Club 25: 107 (1898).

An erect or ascending, more or less caespitose, glabrous perennial, 3 to 7 dm. high, from short, creeping rootstocks, with linear-lanceolate leaves and dense, exserted, cylindrical panicles. Culms slender, compressed, generally somewhat geniculate at the base, scabrous below the panicle, otherwise very smooth; nodes glabrous; sheaths glabrous, compressed, the lower much longer than the internodes, imbricate, distichous, smooth on the hyaline margins; ligule ciliate, with very short hairs; leaf-blades 1 to 3 dm. long, 3 to 7 mm. wide, scarcely narrowed at the base, long-tapering to the apex, slightly scabrous on the upper surface and margins, glabrous below, sometimes with a few long white hairs at the throat. Panicles dense, spike-like, 2 to 5 cm. long, nearly 1 cm. in diameter, exclusive of the setae; rachis angular, pubescent; branches short, contiguous, 1 or rarely 2-flowered; setae 8 to 12, involucrate, spreading, 5 to 10 mm. long, unequal, slender, pale, yellowish or sometimes purplish, finely antrorsely scabrous. Spikelets ovate, acute, 2 to 2.5 mm. long; first glume about one-third as long as the spikelet, ovate, acute or obtuse, 3-nerved; second glume one-half to two-thirds as long as the spikelet, ovate, acute, 5 to 7 nerved, the mid-nerve excurrent, the lateral ones anastomosing or abruptly vanishing in the hyaline margin; third glume equaling the flowering glume and slightly inclosing it by

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about equaling the nodes, striate, glabrous, margins hyaline, smooth; ligule very short, ciliate-fringed; leaf-blades plane or becoming involute in drying, 1 to 3 dm. long, 3 to 6 mm. wide, long, slender, acuminate, scabrous, usually bearded with few long white hairs at the throat and sparingly pilose. Panicles pale, dense, cylindrical, spiciform, 2 to 5 cm. long, 5 to 6 mm. in diameter; rachis pubescent; branches very short, generally 1-flowered; setae 6 to 10, involucrate, spreading-erect, 1 to 1.5 cm. long, antrorsely scabrous, pale. Spikelets 3 to 3.5 mm. long, broadly ovate, acute, apiculate; first glume one-half as long as the spikelet, narrowly cordate, acuminate, 5-nerved; second glume about as long as the spikelet, 7-nerved, acute, apiculate; third glume equaling the spikelet, sulcate, 7-nerved, subtending a lanceolate, hyaline palea nearly its own length; flowering glume broadly ovate or rotund-ovate, acute, apiculate, strongly transversely undulate-rugose, the inclosed palea nearly smooth, plane.

Australia.

Type specimen collected by F. von Mueller, Victoria River, Queensland. Distributed under the name *Setaria glauca* Beauv., but at once distinguished by its narrower leaves, long setae, larger spikelets, longer first and second glumes, and more strongly rugose flowering glume, all the glumes being prominently apiculate.

its infolded margins, acute, apiculate, 5-nerved, sulcate, subtending a broad, hyaline palea of its own length; flowering glume elliptical-ovate, acute, striate, finely transversely rugose for its whole length, the inclosed palea slightly convex at the base, plane or concave above.

In moist soil, New Jersey to Florida and Texas, north to Kansas and Missouri; Mexico, West Indies, South America. May–October.

SPECIMENS EXAMINED.—*New Jersey*: Holmes 1890. *North Carolina*: Biltmore, 6026a Biltmore Herb. 1898; no locality, McCarthy 1889. *South Carolina*: Santee Canal, Ravenel. *Georgia*: Augusta, 200 Kearney 1895. *Florida*: Duval Co., 3614 Curtiss 1883; Jacksonville, 4745 Curtiss 1894, 5411 Curtiss 1895; 19 Combs 1898; Bay Head, 659 Combs 1898; Cedar Key, 775 Combs 1898; Eustis, 566 Nash 1894. *Alabama*: Mobile, 42, 58 Kearney 1895. *Mississippi*: Chandeleur Island, Tracy 1897; Agricultural College, 34 Kearney 1896; Starkville, 22 Kearney 1896; *Louisiana*: New Orleans, 343 Kearney 1896; Oberlin, 218 Ball 1898; Pointe-à-la-Hache, 54 Langlois 1883. *Indian Territory*: Verdigris, 744 Bush 1894. *Texas*: Hampstead, 840 Hall 1872; Bexar Co., 207 Jermy; Pinto Creek, Kinney Co., 82 Hill 1895; Kerrville, 1889 Heller 1894; Home Canyon, 423 Carleton 1891; Houston, 15 Engelmann 1842; Ennis, Smith 1897; Dallas, Reverchon 1875; without locality, C. Wright 1849; Nealley 1884; Reverchon 1879, 1883. *New Mexico*: Drummond, 984 Fendler 1847. *West Indies*: St. Thomas, 185 Eggers 1880. *Cuba*: 3888 Wright 1865. *Puerto Rico*: 208 Sintenis 1884. *Mexico*: 536 Gregg 1848–49; Cuicatlan, 1652 Nelson 1894; Guadalajara, 246 Palmer 1886. *Lower California*: San Jose del Cabo, 15 Brandegee 1890.

Very readily distinguished from *C. glauca* (L.) Scribn., to which it has been referred as a variety and with which it is confused, by its perennial roots, longer, glabrous leaves, longer setæ and smaller spikelets.

This variable species has long passed under the name *Setaria laevigata*, but from careful consideration it would seem that *imberbis* is the proper name. Trinius (Icon. t. 196, Fig. A) says in his description of the plate that Fig. A is *Setaria gracilis* Kunth, which can hardly be a synonym of *Panicum imberbe* Poir.,<sup>1</sup> but below in referring to the plate he calls Fig. A *Setaria imberbis*; hence the confusion regarding this species. Poiret in his original description says that the specimens on which he based this species were from Carolina, Puerto Rico, and Brazil, and that they differed from *Panicum glaucum* of Europe not only in having the bristles of the involucre longer, but also by the leaves being destitute of hairs at the apex of the sheaths.

*Chaetochloa gracilis*, the slender form of Trinius t. 196, does not grow naturally north of Texas, and, moreover, it can not be Poiret's *Panicum imberbe*, as is seen from the original description.

**CHÆTOCHLOA IMBERBIS PENICILLATA** (Nees) n. comb. *Panicum penicillatum* Nees. Agrost. Bras. 242 (1829). (Fig. 2.)

An erect or ascending perennial, sometimes rooting at the lower nodes, with panicles 3 to 12 cm. long, and long, widely spreading yellow, brown, or purplish setæ, otherwise as in the type.

In fields and pine woods Georgia to Texas, Mexico, and South America.

SPECIMENS EXAMINED.—*Georgia*: Augusta, 227 Kearney 1895; Savannah, 186 Kearney 1895. *Florida*: Waldo, 702 Combs 1898; Lake City, 83, 179 Combs & Rolfs 1899; Monticello, 346 Combs 1898; Old Town, 877 Combs 1898; Quincy, 396 Combs 1898; Apalachicola, 116 Kearney 1895. *Louisiana*: Pointe-à-la-Hache, 55 Langlois 1880; Calhoun, 41 Ball 1898. *Mississippi*: Ocean Springs, 1105. Polard 1896; Biloxi, 217 Kearney 1896. *Texas*: Ennis, J. G. Smith 1897, without locality; Hall 1872; Nealley 1887.

<sup>1</sup>Cujus syn. vix erit *P. imberbe* Poir.

**CHÆTOCHLOA IMBERBIS PERENNIS** (Hall) n. comb. *Setaria perennis* Hall, Trans. Kans. Acad. Sci. 13: 102 (1893). *Chætochloa versicolor* Bick. Bul. Torr. Bot. Club. 25: 105, pl. 328 (1898).

A slender, scarcely tufted, loose form, 6 to 12 dm. high, with very slender wiry culms, which are naked below, long, narrow leaves, and rather slender, long-

exserted panicles, 2.5 to 7 cm. long. Spikelets generally purplish. Setæ very slender, 6 to 10 mm. long, yellowish-green or purple.

In brackish marshes, along the coast from Connecticut to Florida and Mississippi, and in alkaline and saline bottoms, Kansas and Indian Territory. June–September.

**SPECIMENS EXAMINED.**—*Maryland*: Bay Ridge, Scribner 1897; Takoma Park, Williams 1899. *Florida*: Barstow, 1232 Combs 1898; Homosassa, 924, 969 Combs 1898; Jacksonville, 13 Combs 1898; Lake City, 79 Combs 1898; Madison, 237 Combs 1898; Cedar Key, 794 Combs 1898; Ellzey, 826 Combs 1898. *Louisiana*: Alexandria, 185 Ball 1898. *Mississippi*: Biloxi, Tracy 1898. *Indian Territory*: Bigelow 1853–54. *Kansas*: Comanche Co. 1544 Hitchcock 1896; Hutchinson, 2 Smyth 1890.

This form is not worthy of specific rank, as all gradations are found between it and the typical *C. imberbis*. The characters used by Bicknell in separating his species, such as the longer and fewer nerved glumes, absence of hairs at the base of the leaves, pur-



FIG. 2.—*Chætochloa imberbis penicillata*: a, spikelet showing the setæ; b, c, views of the spikelet; d, flowering glume, dorsal view.

plish flowering glume, etc., are not constant, but are found to be extremely variable.

**CHÆTOCHLOA IMBERBIS GENICULATA** (Lam.) n. comb. *Panicum geniculatum* Lam. Encycl. 4: 727 (err. typ. 737) (1797). *Setaria geniculata* Beauv. Agrost. 51 (1812). *Chamaeraphis glauca geniculata* Beal, Grasses of N. Am. 2: 156 (1896).

A stout, glaucous form, 5 to 10 dm. high, with geniculate culms, broader leaves, and elongated panicles 6 to 12 cm. in length; leaf-blades 1 to 3 dm. in length, 5 to 8 mm. wide. Panicles erect, yellowish, 5 to 8 mm. in diameter. Spikelets as in the type.

West Indies, Mexico, South America.

SPECIMENS EXAMINED.—*Mexico*: Durango, 378, 471, 539 Palmer 1896; Rio Hondo, 3156 Holway 1898; Jalisco, Guadalajara, 293 Palmer 1886; Oaxaca, 5723 Galeotti 1840; 342 Conzatti & Gonzalez 1897; 710 Nelson 1894; Coahuila, 431 Pringle 1885; Guanajuato, Dugès 1893; Orizaba, 631 Botteri, 2639 Bourgeau, 1865-66; 115 Seaton 1891; San Luis Potosi, 1041 Schaffner 1876; without locality, Ghiesbreght 1842. *Cuba*: 3472 Wright 1860-64.

*St. Croix*: 243 Ricksecker 1896.

*Puerto Rico*: 6861 Sintenis 1887.

Fournier<sup>1</sup> makes a variety *latifolia* of this species (*Setaria geniculata*), based on 2639 Bourgeau and 5723 Galeotti, both of which are represented in the Gray Herbarium. In these specimens none of the leaves exceed 8 mm. (4 lines) in width. In the original description the leaves are described as "*longues, larges du trois à quatre lignes, planes, glabres,*" etc. In others specimens cited by Fournier as representing the type 350 Liebmann and Ghiesbreght 1842, represented in the United States National Herbarium, the plants are depauperate, with narrow leaves, not exceeding 6 mm. wide, and shorter, narrower spikes. In Jaquin<sup>2</sup> the description and plate represent the type as having broad leaves and thick, elongated spikes; hence it would seem that Fournier had a wrong idea of the type, which is best represented by his variety *latifolia*.

**CHÆTOCHLOA IMBERBIS STREPTOBOTRYS** (Fourn.) n. comb. *Setaria streptobotrys* Fourn. Mex. Pl. Enum. Gram. 47 (1886).

A pale, glaucous form, 4 to 6 dm. high, with stout, erect culms, linear-lanceolate, glaucous, and nearly glabrous leaves and pale-green panicles, 6 to 10 cm. long, about 6 mm. in diameter; setæ pale-green, spreading. Closely related to var. *geniculata*.

Mexico.

SPECIMENS EXAMINED.—*Mexico*: Oaxaca, 342 Conzatti & Gonzalez 1897; Coahuila, 431 Pringle 1885; Durango, 378, 381, 471 Palmer 1896.

3. **CHÆTOCHLOA PURPURASCENS** (H. B. K.) n. comb. *Setaria purpurascens* H. B. K. Nov. Gen. & Sp. Pl. 1: 110 (1815). (Fig. 3.)

An erect or ascending, caespitose perennial, 1 to 6 dm. high, from short, creeping root-stocks, with short, lanceolate or linear-lanceolate leaves, short setæ, and dense,



FIG. 3.—*Chætochloa purpurascens*: a, spikelet showing the setæ; b, spikelet showing the first and third glumes; c, flowering glume, dorsal view.

<sup>1</sup> Mex. Pl. Enum. Gram. 46.

<sup>2</sup> Eclogæ Gram. t. 27, *Pennisetum geniculatum*.

cylindrical, usually purplish, spiciform panicles, 1 to 5 cm. in length. Culms slender, branching, and geniculate at the base, glabrous; nodes smooth; sheaths loose, striate, glabrous, shorter than the internodes, margins smooth; ligule very short, ciliate; leaf-blades 5 to 10 cm. long, 4 to 6 mm. wide, scabrous on both sides and on the cartilaginous margins, sometimes nearly smooth beneath, not narrowed at the cordate base, acute or acuminate. Panicles about 5 mm. in diameter, somewhat exserted; rachis angular, pubescent; branches very short,

1 or 2 flowered, approximate; setae 5 to 10, short, unequal, involucrate, 3 to 8 mm. long, flexuous, green or purplish, often barely exceeding the spikelets, antorsely scabrous. Spikelets ovate, acute, 2 mm. long; first glume ovate, acute, 3-nerved, one-third as long as the spikelet; second glume ovate, acute or obtuse, about one-half as long as the spikelet, 5-nerved, mid-nerve excurrent, the lateral ones anastomosing or vanishing in the hyaline margins; third glume equaling the flowering glume, 5-nerved, sulcate, subtending a broadly ovate, hyaline palea of its own length; flowering glume ovate, acute, transversely undulate-striate for its whole length, the inclosed palea equaling its length, striate, plane.

Texas to Mexico, West Indies, Central and South America.

SPECIMENS EXAMINED.—*Texas*: San Diego, Smith 1897; Bexar Co., 207 Jermy; Dallas, Reverchon 1876. *Cuba*: 3472 Wright 1865. *Mexico*: Chiapas, 3023a, 3336 Nelson 1895; City of Mexico,

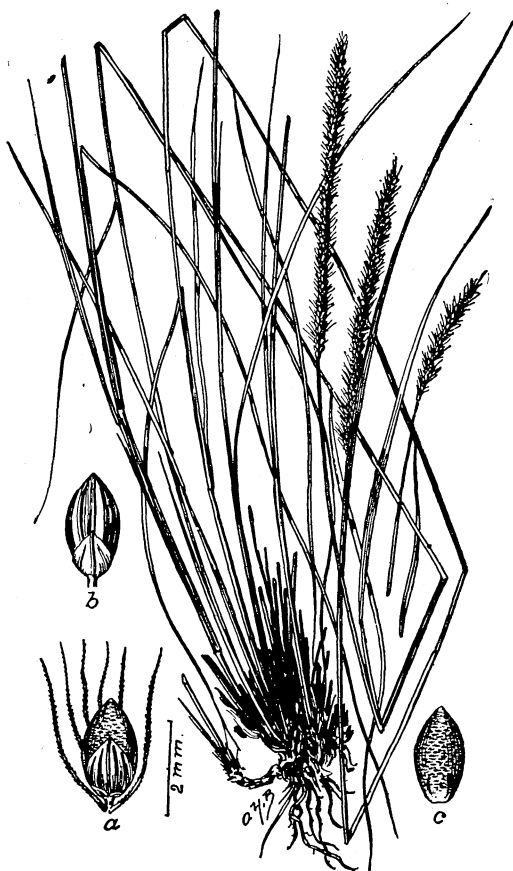


FIG. 4.—*Ohaetochloa gracilis*: a, spikelet showing the setae and second glume; b, spikelet showing the first and third glumes; c, flowering glume, dorsal view.

7 Holway 1896; 3126 Holway 1898; Orizaba, 114, 247 Seaton 1891; 33 Nelson 1894; Plunia, 2482 Nelson 1895; Puebla, Nelson 1893; Chinantha, 350 Liebmann 1841, cited by Fournier<sup>1</sup> under *Setaria geniculata*; valley of Mexico, 231 Bourgeau 1865-66; Colipa, 360 Liebmann 1841, cited by Fournier under *Setaria flava*.

An extremely variable species, at once distinguished from the closely related *C. gracilis* by its shorter, lanceolate or linear-lanceolate leaves and thicker, usually purplish spikes. The form which Fournier referred to *Setaria flava* Kunth, differs from

<sup>1</sup> Mex. Pl. Enum. Gram. 45.



the typical material only in having the panicle pale instead of purple, or at least only the spikelets being tipped with purple.

4. **CHÆTOCHLOA GRACILIS** (H. B. K.) n. comb. *Setaria gracilis* H. B. K. Nov. Gen. & Sp. Pl. 1: 109 (1815). *Setaria imberbis* R. & S. of authors. (Fig. 4.)

A slender, erect, glabrous, caespitose perennial, 3 to 7 dm. high, from short, creeping rootstocks, with linear-setaceous leaves, very slender, spike-like panicles 2 to 6 cm. in length, and short setæ, often barely exceeding the spikelets. Culms very slender, erect, glabrous, cylindrical, simple or somewhat branched at the base; nodes glabrous; sheaths loose, glabrous, shorter than the internodes, not ciliate on the hyaline margins; ligule very short, ciliate; leaf-blades involute-setaceous, 0.5 to 2 dm. long, 1 to 3 mm. wide, smooth or slightly scabrous above, long-acuminate. Panicles cylindrical, dense, 3 to 5 mm. in diameter, branches contiguous, very short, 1-flowered; rachis setose or pubescent; setæ 5 to 8, involucre, unequal, very short, flexuous, equaling or twice exceeding the spikelet, yellowish, antrorsely scabrous. Spikelets 2 mm. long, ovate, acute; first glume triangular-ovate, acute, 3-nerved, one-third the spikelet in length; second glume one-half as long as the spikelet, ovate, acute, 5-nerved; third glume equaling the flowering glume, 5-nerved, sulcate, subtending a broad-ovate, hyaline palea its own length; flowering glume ovate, acute, abruptly apiculate, transversely undulate-rugose. Palea plane, striate.

Alabama, Florida, Texas, Mexico to South America.

SPECIMENS EXAMINED.—*Alabama*: Mobile, on "ballast" and about wharves, 14 Mohr 1891; 19 Kearney 1895. *Florida*: Apalachicola, on "ballast," Chapman, no date. *Texas*: No locality, Buckley 1888; Nealley 1887, 1888; Corpus Christi, Nealley 1891. *Cuba*: 3473 Wright 1860-64; Reed, no date. *Mexico*: Cordova, 5 Fink 1889-1891; Chihuahua, Palmer 1885; Oaxaca 1907, Nelson 1894.

B. Setæ 1-3, not involucre.

\* Panicle dense cylindrical; branches short, approximate.

† Setæ retrorsely scabrous, wholly or in part.

5. **CHÆTOCHLOA BREVISPICA** nom. nov. *Panicum verticillatum parviflorum* Doell in Mart. Fl. Bras. 2<sup>2</sup>: 172. (1877), not *Cenchrus parviflorus* Poir. in Lam. Encycl. 6: 52 (1804). (Fig. 5.)



FIG. 5.—*Chætochloa brevispica*; a, branch showing spikelets and setæ; b, spikelet showing the first and third glumes; c, flowering glume seen from the back; d, anterior view of the flowering glume, showing palea.

A low, spreading, much-branched annual, 1 to 3 dm. high, with short, cylindrical spikes and lanceolate leaves 3 to 6 cm. long. Culms compressed, geniculate, decumbent, very glabrous; nodes smooth; sheaths very loose, striate, compressed, glabrous, margins smooth, shorter than their internodes; ligule short, densely ciliate-fringed with white hairs; leaf-blades 3 to 6 cm. long, 4 to 8 mm. wide, cordate at the base, long-acuminate at the apex, scabrous and sparingly papillate ciliate on both sides, especially below, margins cartilaginous, serrulate-scabrous. Inflorescence dense, cylindrical, 1 to 3 cm. long, about 1 cm. in diameter, purplish; common axis angular, scabrous; branches very short, subverticillate, densely flowered;



FIG. 6.—*Chaetochloa verticillata*: a, b, views of the spikelet, showing the setae.

setae 1 or 2, purple, stout, flexuous, retrorsely scabrous, 3 to 8 mm. long. Spikelets 1.5 to 2 mm. long, nearly sessile, elliptical-ovate; first glume triangular-ovate, acute or obtuse, 3-nerved, about one-third the length of the spikelet; second glume ovate, obtuse, 5 to 7-nerved, nearly equaling the 5 to 7-nerved, acute third glume, which bears a short palea in its axil; flowering glume about 1.5 mm. long, elliptical-ovate, acute, striate, nearly smooth or very finely transversely wrinkled below. Palea similar in texture and markings, about as long as the glume.

Alabama, Louisiana, Mexico, South America, Europe.

SPECIMENS EXAMINED.—*Louisiana*: Port Eads, Langlois 1885, on "ballast." *Alabama*: Mobile, on "ballast," Mohr 1888. *Mexico*: Guadalupe, 484 Palmer 1886.

Very readily distinguished from *C. verticillata* by its smaller size, more spreading habit, short cylindrical spikes, and smaller spikelets.

6. *Chaetochloa verticillata* (L.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 39

(1897). *Panicum verticillatum* L. Sp. Pl. ed. 2, 82 (1762). *Setaria verticillata* Beauv. Agrost. 51 (1812). *Chamaeraphis verticillata* Porter Bul. Torr. Bot. Club. 20: 196 (1893). *Ixophorus verticillatus* Nash Bul. Torr. Bot. Club. 22: 422 (1895). (Fig. 6.)

An erect or ascending, glabrous, somewhat caespitose annual, 3 to 6 dm. high, with linear-lanceolate leaves and interrupted subspiciform panicles 5 to 10 cm. long. Culms geniculate, glabrous, compressed; nodes brown or black, smooth; sheaths loose, shorter than their internodes, smooth, striate, margins glabrous below,

ciliate above; ligule short, hispid-ciliate; leaf-blades flat, soft, 7 to 18 cm. long, 6 to 12 mm. wide, acuminate, abruptly narrowed at the rounded base, scabrous on both sides, serrulate-scabrous on the cartilaginous margins. Panicles spike-like; rachis striate, angular, scabro-hispid; branches subverticillate, short, densely flowered; setæ 1 to 3, stout, flexuous, retrorsely scabrous to the very base, 3 to 6 mm. long. Spikelets nearly sessile, narrowly elliptical-ovate, acute, 2 to 2.5 mm. long; first glume triangular-ovate, acute, 3-nerved, one-third as long as the spikelet; second glume elliptical-ovate, 5 to 7 nerved, mucronate, nearly equaling the 5 to 7 nerved acute third glume and slightly exceeding the flowering glume; third glume subtending a lanceolate, hyaline palea two-thirds its own length; flowering glume about 2 mm. long, narrowly elliptical, rounded at the apex and very shortly apiculate, smooth or with very fine transverse wrinkles below the middle. Palea similar in markings, equaling the glume.

A cosmopolitan weed widely distributed in the eastern United States. Introduced from Europe. July–October.

SPECIMENS EXAMINED.—*Massachusetts*: Salem, Conant 1879. *Connecticut*: New Haven, Allen 1879. *Pennsylvania*: Philadelphia, Parker 1877; Stickers, Smith; Easton, Porter 1895. *Delaware*: Wilmington, 145 Commons 1897. *District of Columbia*: Vasey 1886. *Alabama*: Mobile, 14 Mohr 1891. *Kentucky*: Lexington, Short 1835. *Iowa*: Mt. Cyr, 929 Beard 1897; Mt. Pleasant, 773 Mills 1897. *Missouri*: St. Louis, 267 Eggert 1886. *Wisconsin*: Oshkosh, Random 1896.

7. **CHÆTOCHLOA SCANDENS** (Jacq.) n. comb. *Pennisetum scandens* Jacq. Hort. Vindb. (1801). *Setaria scandens* Schrad. in R. & S. Mant. 2: 279 (1824). *Panicum scandens* Trin. Gram. Pan. 166 (1826).

An erect or ascending caespitose annual, 4 to 7 dm. high, with geniculate, subcompressed culms, linear-lanceolate leaves, and loose, bristly subspiciform panicles 4 to 12 dm. long. Culms slender, branching at the base, scabrous below the panicle, otherwise glabrous; nodes brown or black, smooth; sheaths loose, striate, compressed, glabrous or slightly scabrous above, about equaling the internodes, margins ciliate above; ligule very short, bearded; leaf-blades linear to linear-lanceolate, spreading, plane, 5 to 16 cm. long, 2 to 5 mm. wide, long-acuminate, abruptly narrowed at the rounded base, scabrous and short strigose-pubescent on both sides, serrulate-scabrous on the cartilaginous margins. Panicle cylindrical, 1 to 1.5 cm. in diameter; rachis striate, densely short-pubescent or pilose; branches short, few-flowered, contiguous, spirally arranged; setæ 1 to 3, generally purplish, flexuous, 1 to 2 cm. long, retrorsely scabrous above, antrorsely scabrous at the base, spreading. Spikelets 1 to 1.5 mm. long, ovate, acute, green or purplish; first glume broadly ovate, acute, 3-nerved, one-half as long as the spikelet and inclosing its base; second and third glumes equaling the flowering glume, 5-nerved, acute, apiculate, the third somewhat sulcate; flowering glume ovate, acute, 1 to 1.5 mm. long, striate, transversely undulate-rugose below, nearly smooth above, the inclosed palea ovate, striate, concave.

West Indies, Central and South America.

SPECIMENS EXAMINED.—*Puerto Rico*: 6498 Sintenis 1887, distributed as *Setaria verticillata* Beauv. *Honduras*: 5583 bis J. Donnell Smith 1888. *Guatemala*: Buena Vista, 4295 J. Donnell Smith 1892. *Venezuela*: 1144 Fendler 1854–55; 1644, 1856–57. *Brazil*: 4356, 4510 Burchell; 174 Riedl.

Readily distinguished from *C. verticillata* by its smaller spikelets, strigose-pubescent leaves, and longer, irregularly spreading setæ, which are retrorsely scabrous above and antrorsely scabrous at the base.

†† *Setæ antrorsely scabrous.*

‡ *Flowering glume smooth or nearly so.*

§ *Rachis scabrous.*

8. **CHÆTOCHLOA AMBIGUA** (Guss.) n. comb. *Setaria verticillata* var. *ambigua* Guss. Prodr. 1: 80 (1827). *Setaria ambigua* Guss. Fl. Sic. Syn. 1: 114 (1842). Not *Setaria ambigua* Schrad. Linnæa 12: 430 (1838). (Fig. 7.)

A caespitose, erect, much branched annual, 2 to 5 dm. high, with compressed culms, lanceolate leaves, and rather loose spicate panicles 4 to 10 cm. long. Culms



FIG. 7.—*Chaetochloa ambigua*: a, spikelet showing setæ; b, c, views of the spikelet; d, flowering glume, dorsal view.

geniculate at the base, glabrous, leafy, the nodes brown, glabrous; sheaths striate, compressed, loose, about equaling the internodes, thin, glabrous, the margin ciliate above; ligule about 1 mm. long, densely ciliate-fringed with white hairs, which are 1 mm. long or less. Leaf-blades lanceolate, cordate at the base, long-acuminate at the apex, 5 to 15 cm. long, 6 to 15 mm. wide, scabrous on both sides and on the cartilaginous margins. Axis of the inflorescence channeled, scabrous, but not pilose; branches short, subverticillate, densely flowered, the lower rather remote; setæ solitary, stout, somewhat flexuous, antrorsely scabrous, 4 to 8 mm. long. Spikelets elliptical, 2 to 2.5 mm. long; first glume triangular-cordate, 3-nerved, clasping the base of the spikelet and about one-third its length; second and third glumes equaling the flowering glume in length, obtuse, 5 to 7 nerved, the third with a palea; flowering glume 2 mm. long, elliptical, rounded

at the apex, striate, very finely transversely wrinkled, not rugose. Palea similar in texture and markings.

Collected on "ballast," Camden, N. J., by F. Lamson-Scribner, 1884, and at Mobile, Ala., by Chas. Mohr, 1884.

An adventitious European annual with the habit and inflorescence of *C. verticillata* (L.) Scribner, but readily distinguished from that species by its having the setæ antrorsely instead of retrorsely scabrous. Distinguished from *C. viridis* (L.) Scribner, by its loose, subverticillate panicles and scabrous, not pilose, rachis.

§ § *Rachis pilose.*

9. *Chaetochloa viridis* (L.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4 : 39 (1897). *Panicum viride* L. Sp. Pl. ed. 2, 83 (1762). *Setaria viridis* Beauv. Agrost. 51 (1812). *Chamaeraphis viridis* Porter Bul. Torr. Bot. Club. 20 : 196 (1893). *Ixophorus viridis* Nash Bul. Torr. Bot. Club. 22 : 423 (1895). (Fig. 8.)

An erect, glabrous, caespitose annual, 2 to 9 dm. high, with short, lanceolate leaves and dense, cylindrical, spike-like green panicles 2 to 10 cm. long. Culms usually much branched at the base, glabrous, compressed; nodes smooth; sheaths compressed, loose, longer than the internodes, ciliate on the margins; ligule short, ciliate with long, white hairs; leaf-blades 0.5 to 2.5 dm. long, 4 to 10 mm. wide, scarcely narrowed at the cordate base, long-acuminate, slightly scabrous on both sides or sometimes nearly glabrous, serrulate-scabrous on the cartilaginous margins. Panicles linear-ovate in outline, tapering to the obtuse apex; rachis striate, villous, generally about 1 cm. in diameter, exclusive of the bristles; setae slender, strict, spreading, antrorsely scabrous, 1 to 1.5 cm. long, green or rarely purplish. Spikelets about 2 mm. long, elliptical; first glume triangular-ovate, 3-nerved, about one-third the spikelet in length; second and third glumes elliptical, obtuse, 5-nerved, equaling the spikelet, the third glume subtending a lanceolate, hyaline palea one-third its own length; flowering glume elliptical, rounded at the apex, finely and faintly transversely wrinkled below, or only striate and pitted, the inclosed palea equaling it in length, similar in texture and markings.

In waste places and cultivated grounds throughout North America. Naturalized from Europe. July-September.



FIG. 8.—*Chaetochloa viridis*: a, branch showing spikelet and setae; b, c, views of the spikelet; d, flowering glume, dorsal view.

SPECIMENS EXAMINED.—*Newfoundland*: Wagborne 1892. *Ottawa*: Macoun 1894, Fletcher 1891. *Maine*: Auburn, Merrill 1897. *New Hampshire*: Peterboro, 236 Robinson 1897. *Connecticut*: 26 Wilson 1892. *New York*: Union Springs, 37 Dudley; Oxford, Coville 1884. *Pennsylvania*: Easton, Porter 1887; Harrisburg, Small 1888; Philadelphia, Smith. *Delaware*: Stanton, 147 Commons 1897. *District of Columbia*: Blanchard 1891, 532 Pollard 1895, Topping 1895. *Ohio*: Ricksecker 1894. *Michigan*: Clifton, 629 Farwell. *Tennessee*: Knoxville, Scribner. *Iowa*: Battle Creek, 956 Preston 1897; Fayette Co., 273 Fink 1894; Carnarvon, 291 Pammel 1896; Clinton, 268 Ball 1895; Des Moines, 28 Ball 1898; Manchester,

1007 Ball 1897. *Kansas*: Riley, 576 Norton 1895; Syracuse, 129 Thompson 1893; Hooker Co., 1568 Rydberg 1893; Wiegand, 2684 Clements 1893; Central City, 262 Shear 1895, 2009 Rydberg 1895; Kearney, Holmes 1889. *Wisconsin*: Oshkosh, Random 1896; Newbold, 1701 Cheney 1893. *South Dakota*: Aberdeen, 123 Griffiths 1896; Redfield, 208 Griffiths 1897. *Missouri*: St. Louis, 268 Eggert. *Colorado*: Thomas 1869, 510 Jones 1878; Colorado Springs, 2158 Williams 1896; Glenwood Springs, 1304 Shear & Bessey 1898. *Utah*: 6034 Jones 1894; Caineville, 5696b Jones 1894. *Oregon*: Milton, 33 Brown 1896. *North Carolina*: Magnetic City, 9 Wetherby 1895. *Alabama*: Tuskegee, 15 Carver 1897. *Mississippi*:

Ocean Springs, 1 Forkert 1898. *Texas*: Kerrville, Nealley 1899, Heller 1894. *New Mexico*: Mesilla, 89 Wootton 1897. *Arizona*: Verde Valley, 532 McDougal 1891. *Mexico*: 349 Liebmman 1841-1843.

10. *Chaetochloa italica* (L.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 39 (1897). *Panicum italicum* L. Sp., Pl. 56 (1753). *Setaria italica* Beauv. Agrost. 51 (1812) *Chamaeraphis italica* Kuntze Rev. Gen. Pl. 2: 768 (1891). *Exophorus italicus* Nash Bul. Torr. Bot. Club 22: 423 (1895). (Fig. 9.)

A stout, erect, somewhat glaucous annual, with broad leaves and large, dense, compound, spiciform panicles 8 to 20 cm. in length. Culms simple or branching at the base, 3 to 8 mm. in diameter below, glabrous or slightly scabrous below the nodes and panicle; nodes bearded with short appressed hairs; sheaths loose, striate, glabrous or somewhat scabrous, subcompressed, generally exceeding the internodes, ciliate on the margins; ligules short, densely ciliate-fringed with white hairs 2 to 3 mm. long; leaf-

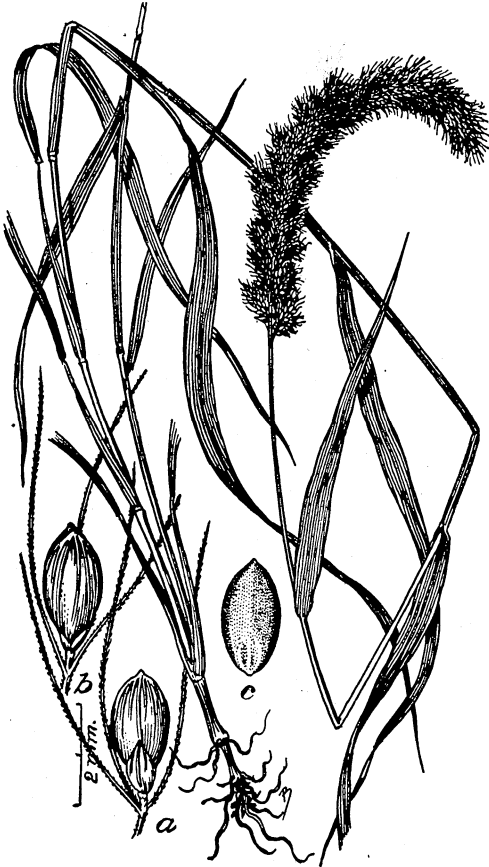


FIG. 9.—*Chaetochloa italica*: a, b, views of the spikelets, showing the setae; c, flowering glume, dorsal view.

blades lanceolate, narrowed at the base, long-acuminate, 2 to 4 dm. long, 1.5 to 3 cm. wide, scabrous on both sides, serrulate-scabrous on the cartilaginous margins. Panicles dense, cylindrical, green, becoming yellow at maturity, 2 to 3 cm. in diameter, obtuse or truncate at both ends, sometimes interrupted below; rachis densely villous, branches 1 to 2 cm. long, contiguous, densely flowered; setae 1 to 3, green or purplish, 3 to 10 mm. long, often shorter than the spikelets or nearly obsolete, antrorsely scabrous. Spikelets elliptical, strongly convex, 2.5 to 3 mm. long, obtuse; first glume one-fourth to one-half as long as the spikelet, acute, 1 to 3 nerved; second and third glumes about equaling the flowering glume, 5 to

7 nerved; flowering glume glossy, nearly smooth or finely and faintly transverse-rugose or pitted, striate; the inclosed palea similar in markings, slightly convex. Widely cultivated and often an escape in fields and waste places; very variable. Quebec to Minnesota, south to Florida and Texas. Native of Europe and Asia. July–September.

***Chaetochloa italica germanica*** (Mill.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 6: 32 (1897). *Panicum germanicum* Mill. Gard. Dict., ed. 8, 1 (1768). *Setaria germanica* Beauv. Agrost. 51 (1812).

A smaller form, 2 to 6 dm. high, with slender culms, usually branching at the base; leaves 0.5 to 2 dm. long, 5 to 10 mm. wide, scabrous. Panicles dense, cylindrical, obtuse at the apex, usually tapering at the base, green or purplish, 5 to 10 cm. long, about 1 cm. in diameter; setæ purple, rarely green, 5 to 15 mm. long, much exceeding the spikelets. Flowering glume green or purplish, when green, usually more or less blotched with purple.

Like *C. italica*, this variety is widely cultivated in this country under the name of Hungarian grass or millet, with about the same range as the type; often escaped from cultivation in fields and waste places. Some forms of this grass can scarcely be distinguished from *C. viridis* (L.) Scribn., and it is probably only a form of that species changed by cultivation and intermediate between *C. viridis* and *C. italica*.

11. ***Chaetochloa magna*** (Griseb.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 39 (1897). *Setaria magna* Griseb. Fl. Brit. W. Ind. 554 (1864). *Chameraphis magna* Beal. Grasses of N. Am. 2: 152 (1896). (Fig. 10.)

A coarse, stout, erect perennial (?) 10 to 36 dm. high, with cylindrical culms 0.5 to 2 cm. thick at the base, linear-lanceolate leaves and dense, cylindrical panicles 1.5 to 3 dm. long. Culms branching at the base, glabrous or slightly scabrous below the smooth nodes; sheaths loose, spreading, striate, compressed, glabrous, scabrous on the keel, margins smooth and hyaline below, densely ciliate-fringed above; ligule very short, ciliate-fringed with white hairs; leaf-blades 3 to 6 dm. long, 1 to 3 cm. wide, long attenuate-pointed, gradually narrowed to the base, scabrous on both sides, serrulate-scabrous on the cartilaginous margins. Panicles green, virgate, generally interrupted below, 2 to 5 cm. in diameter; rachis striate, densely pilose, branches 1 to 5 cm. long, strict, densely flowered, contiguous, much exceeding their internodes, or the lower rather remote; setæ 1 to 3, green,



FIG. 10.—*Chaetochloa magna*: a, branch showing spikelet and setæ; b, view of the spikelet; c, flowering glume; d, anterior view of the flowering glume, showing palea.

slender, antrorsely scabrous, 8 to 11 mm. long. Spikelets elliptical, acute, 2 mm. long; first glume broadly ovate, acute or obtuse, 3 to 5-nerved, inclosing the base of the spikelet; second glume equaling the spikelet, short-apiculate, 5 to 9-nerved; third glume 5-nerved, slightly sulcate, subtending an ovate, hyaline palea nearly its own length; flowering glumes elliptical-ovate, acute, short-apiculate, nearly 2 mm. long, very smooth, glossy, not striate or rugose, the inclosed palea equaling the glume, very smooth.

Low grounds and marshes, often in shallow water, Delaware to Florida, Louisiana, and western Texas, Bermuda, West Indies, Central America.

SPECIMENS EXAMINED.—*Delaware*: Collins Beach, 148 Commons 1892; Woodland Beach, 148a Commons 1892; *District of Columbia*: Cultivated, Vasey 1889; *Virginia*: Smiths Island, Palmer 1897; *Florida*: Curtiss 1885; Merritts Island, Indian River, 3618 Curtiss 1879; Apopka, 21 Baker 1897; Fort Ogden, Lowe 1892; Deland Co., Hill 1899; Grasmere, 1054 Combs & Baker, 1898; Barstow, 1219 Combs 1898; Homosassa, 464 Combs 1898; Eustis 1279 Nash 1894; *Louisiana*: Pointe-à-la-Hache, 56 Langlois 1879; *Texas*: 801 Wright 1849; *Bermuda*: Munro 1864; *Costa Rica*: 6825 Pittier 1892.

†† Flowering glume transversely undulate-rugose.

† Rachis very densely pilose.

12. **CHÆTOCHLOA LONGIPILA** (Fourn.) n. comb. *Setaria longipila* Fourn. Mex. Pl. Enum. Gram. 47 (1886).

An erect, somewhat caespitose, glabrous annual, 3 to 5 dm. high, with slender culms, short, lanceolate leaves and somewhat exerted, green, subspiciform panicles 2 to 7 cm. in length. Culms glabrous, except below the panicle, branching at the base; nodes brown, bearded with appressed hairs; sheaths slightly compressed, striate, glabrous, much shorter than the internodes, ciliate on the margins, slightly bearded at the apex; ligule short, ciliate-fringed with long white hairs; leaf-blades 5 to 10 cm. long, 5 to 10 mm. wide, tapering to the base and to the acute or acuminate apex, scabrous on the upper side and on the cartilaginous margins, nearly smooth beneath. Panicles about 6 mm. in diameter, interrupted, the branches short, few-flowered; rachis densely pilose-pubescent, with long, erect, white hairs extending a short distance below the panicle; setae 1 to 3, green, stout, antrorsely scabrous, flexuous, 3 to 5 mm. long. Spikelets ovate-globose, acute, about 1.7 mm. long; first glume about one-half as long as the spikelet, triangular-ovate, acute, 3-nerved, slightly inclosing the base of the spikelet; second glume equaling the flowering glume, strongly convex, 5-nerved; third glume slightly exceeding the flowering glume and somewhat inclosing it, 5-nerved, apiculate, subtending a broadly-ovate, hyaline palea of nearly its own length; nerves in all the glumes green, prominent; flowering glume strongly convex, broadly ovate, acute, strongly transversely undulate-rugose, the inclosed palea striate, strongly convex at the base, concave above, equaling the glume in length.

Mexico. August.

SPECIMENS EXAMINED.—2017 Rose 1897, foothills of the Sierra Madre Mountains, Territorio de Tepic, between Agnacato and Dolores.

This species has much the same habit as *C. liebmanni pauciflora*, but is at once distinguished from that and other related forms by its small, ovate, globose spikelets and remarkably dense pilose-pubescent rachis.

†† Rachis thinly pilose.

= Leaves scabrous.

13. **Chætochloa corrugata** (Ell.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 39 (1897). *Panicum corrugatum* Ell. Sk. Bot. S. Car. & Ga. 1: 113 (1817). *Setaria*



*corrugata* R. & S. Mant. 2: 276 (1824). *Chamaeraphis corrugata* Kuntze Rev. Gen. Pl. 2: 770 (1891). (Fig. 11.)

A rather stout, erect or ascending caespitose annual, 6 to 10 dm. high, with elongated, spike-like panicles and linear-lanceolate, scabrous leaves. Culms compressed, striate, scabrous below the nodes and panicle, otherwise smooth, much branched at the base, often geniculate and rooting at the lower nodes; nodes brown, bearded with short appressed hairs; sheaths very loose, compressed, keeled, the lower ones usually much exceeding the internodes, scabrous or sometimes nearly smooth, rarely pubescent, smooth or ciliate on the margin; ligule fringed with rather rigid white hairs; leaf-blades 1 to 3 dm. long, 3 to 6 mm. wide, scabrous on both sides, serrulate-scabrous on the cartilaginous margins, tapering to the base, acuminate-pointed. Panicles cylindrical, dense, narrowed to the obtuse apex, 6 to 16 cm. long, 6 to 15 mm. in diameter below, exclusive of the setae; rachis angular, pilose; branches short, contiguous, densely 5 to 15 flowered; setae 1 or rarely 2 at each spikelet, green or purplish, erect-spreading, flexuous, 5 to 15 mm. long, antrorsely scabrous. Spikelets ovate, acute, about 2 mm. long, gibbous; first glume one-third to one-half as long as the spikelet, ovate-cordate, acute, 3 to 5 nerved, inclosing the base of the spikelet; second glume broadly ovate, acute or obtuse, apiculate, about four-fifths as long as the spikelet, 5 to 7 nerved, the mid-nerve excurrent, the lateral ones anastomosing or abruptly vanishing in the hyaline margin; third glume equaling and slightly inclosing the flowering glume, sulcate, 5-nerved, subtending a lanceolate, hyaline palea, nerves in all the glumes green, prominent; flowering glume ovate, acute, convex, very strongly transversely undulate-rugose for its whole length; the inclosed palea transversely striate, slightly convex at the base, plane above.

In waste places, cultivated fields, etc., Georgia to Florida. July-October.

SPECIMENS EXAMINED.—*Florida*: Jacksonville, 3616 Curtiss; no locality, Chapman; Duval Co., 328 Fredholm 1893; Apalachicola, 108 Kearney 1895; Anastasia Island, 175 Kearney 1895; Grasmere, 1047 Combs & Rolfs 1898; Cedar Key, 795 Combs 1898; Orange, Baker 1897; Homosassa, 944 Combs 1898.

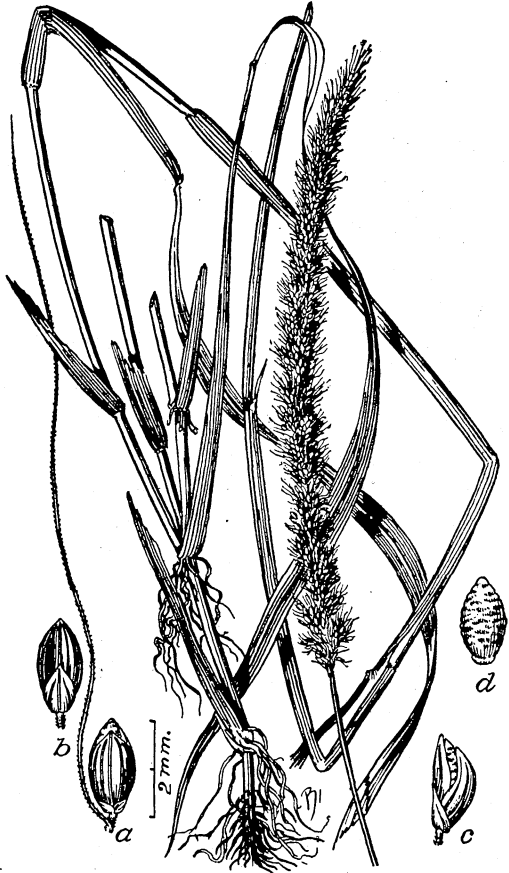


FIG. 11.—*Chaetochloa corrugata*: a, spikelet showing seta; b, c, views of the spikelet; d, flowering glume, dorsal view.

**CHÆTOCHLOA CORRUGATA PARVIFLORA** (Poir.) n. comb. *Cenchrus parviflorus* Poir. in Lam. Encycl. 6: 52 (1804). *Setaria ventenatii* Kunth Rev. Gram. 1: 251. t. 37 (1829). *Panicum glaucum purpurascens* Ell. Sk. Bot. S. Car. & Ga. 1: 113 (1817). (Fig. 12.)

A more slender form 2 to 7 dm. high, much branched from the base, leaves shorter, panicles exserted, 2 to 7 cm. long, branches few-flowered, setæ spreading, green or purple; spikelets as in the type.

In fields and waste places, South Carolina to Florida, West Indies. April–October. SPECIMENS EXAMINED.—Specimen in Herb. Phil. Acad. Sci., collected by Elliot,

South Carolina or Georgia.

Florida: Indian River, Curtiss 1879; Jacksonville, 5124 Curtiss 1894; 4041 Curtiss 1893; without locality, Curtiss 1885; Vesterand 1889; Duval Co., 187 Fredholm 1893, Eustis 640, 1382 Nash 1894; Lake City, 140 Combs & Rolfs 1898; Gainesville, 721, 723 Combs 1898; Homosassa, 945 Combs 1898; Barstow, 1177 Combs 1898; Old Town, 865 Combs 1898; Dunnellon, 914a Combs 1898; Manatee Co., 1287, 1292 Combs 1898; Miami, 253 Pollard 1898.

== Leaves pilose or pubescent.

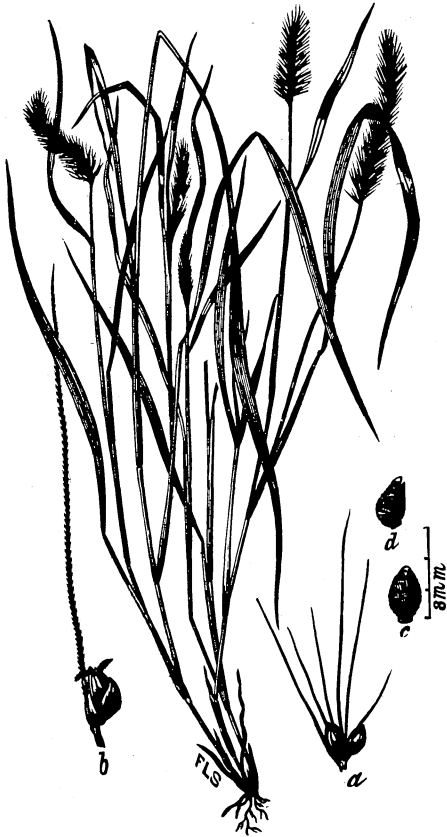


FIG. 12.—*Chaetochloa corrugata parviflora*: a, branch showing two spikelets and setæ; b, spikelet; c, d, views of the flowering glume.

#### 14. **CHÆTOCHLOA GIBBOSA** sp. nov.

An erect, densely caespitose, pubescent perennial, 4 to 7 dm. high, with rather loose, cylindrical, exserted panicles, compressed sheaths, and linear-lanceolate leaves, which are strongly pilose on both sides with long spreading white hairs. Culms slender, smooth, cylindrical; nodes brown or black, smooth; sheaths loose, striate, smooth, the margin densely ciliate with long erect white hairs, bearded at the apex; ligule brown, about 1 mm. long, densely ciliate-fringed with white hairs 3 or 4 mm. long; leaf-blades 1 to 2.5 dm. long, 5 to 7 mm.

wide, abruptly rounded at the base, long-acuminate, scabrous on both sides and on the cartilaginous margins. Panicle 5 to 7 cm. long, loose, branches very short, few-flowered; setæ 1 or 2 at each spikelet, spreading-erect, flexuous, 8 to 15 mm. long, antrorsely scabrous. Spikelets ovate-globose, 2 mm. long, acute; first glume nearly one-half as long as the spikelet, broadly ovate-cordate, obtuse, apiculate, 5-nerved, inclosing the base of the spikelet; second glume broadly ovate, obtuse, abruptly apiculate, 5 to 7 nerved, about four-fifths as long as the spikelet; third glume equaling and slightly inclosing the flowering glume, 5-nerved, plane, subtending a lanceolate, hyaline palea; flowering

glume strongly gibbous, acute, short-apiculate, transversely undulate-rugose, except at the nearly smooth base and apex, the inclosed palea broadly elliptical-ovate, very strongly convex, transversely striate.

Type specimen in Gray Herbarium Cambridge, No. 528 (828?), "Herbarium Berlandierianum Texano-Mexicanum," no locality or date.

A very distinct species, readily recognized by its broad-linear, pilose leaves, densely bearded sheath-margins and ligule, long first glume, and strongly convex palea.

15. **CHÆTOCHLOA HISPIDA** sp. nov. (Fig. 13.)

A simple or sparingly branched, erect, somewhat hirsute annual, about 6 dm. high, with linear-lanceolate leaves and exserted, cylindrical, spike-like panicles about 6 cm. long. Culm slender, compressed below, somewhat geniculate, striate, scabrous below the panicle, thinly pilose for its whole length with scattered white hairs; nodes bearded with appressed hairs; sheaths compressed, striate, strigose with rather long white hairs, especially above and on the margins; ligule short, ciliate; leaf-blades 10 to 15 cm. long, 4 to 6 mm. wide, tapering to the base, acuminate, scabrous on both sides and margins, papillate-pilose on the nerves on both sides, mid-nerve very prominent on the lower side, smooth. Panicle densely flowered, about 7 mm. in diameter exclusive of the setæ; rachis angular, pilose; branches short, contiguous, 1 to 3 flowered; setæ 1 or 2,



FIG. 13.—*Chætochloa hispida*: a, spikelet showing seta; b, c, views of the spikelet; d, flowering glume, dorsal view.

green, spreading, 8 to 12 mm. long, antrorsely scabrous above, nearly smooth at the base; first glume nearly one-half as long as the spikelet, broadly ovate-cordate, acute, apiculate, 3-nerved, inclosing the base of the spikelet; second glume broadly-ovate, obtuse, about four-fifths as long as the spikelet, short-apiculate, 7-nerved, the mid-nerve excurrent, the lateral ones vanishing; third glume equaling the flowering glume, sulcate, 5-nerved, subtending a lanceolate, hyaline palea; flowering glume elliptical-ovate, acute, strongly gibbous, transversely undulate-rugose, the inclosed palea convex at the base, plane above.

In sandy pine woods, Cuba. Type specimen in the Gray Herbarium, Cambridge, collected by C. Wright in January, 1865; no number.

Related to *C. corrugata* (Ell.) Scribn., but readily distinguished by its more simple habit,

hirsute sheaths, pubescent leaves, and strongly rugose flowering glumes. This specimen is cited by Grisebach, *Plant. Cub.* 234 (1866), under *Setaria glauca imberbis*.

16. **CHÆTOCHLOA LEUCOPILA** sp. nov. (Fig. 14.)

A densely caespitose, erect perennial, 2.5 to 4 dm. high, with narrow, involute leaves and rather loose, narrow panicles 3 to 6 cm. in length. Culms very slender, much branched at base, striate, scabrous or scabro-pubescent below the nodes and panicle, otherwise smooth; nodes brown, the lower ones densely bearded

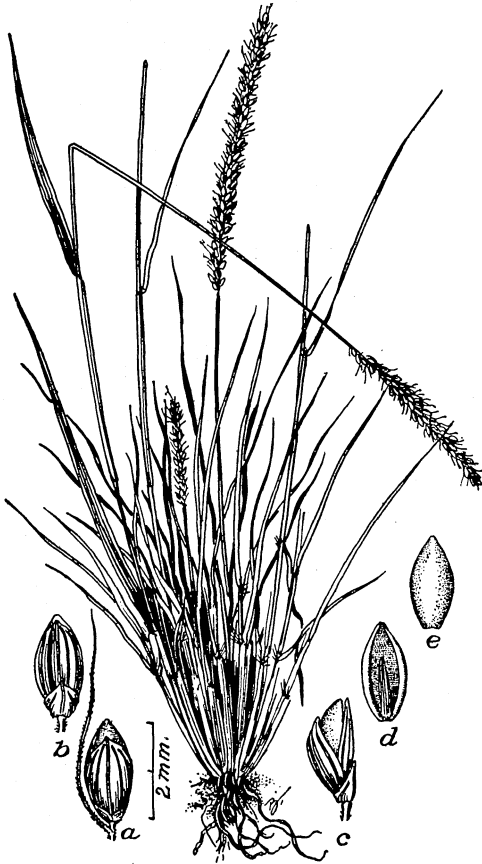


FIG. 14.—*Chætochloa leucopila*: a, spikelet showing seta; b, c, views of the spikelet; d, anterior view of the flowering glume, showing the sterile and fertile palea; e, flowering glume, dorsal view.

with long white hairs, the hairs on upper nodes shorter, sheaths loose, compressed, glabrous or usually slightly scabrous on the keel, margins nearly smooth below, densely ciliate-fringed with long white hairs above; ligule brown, very short, densely ciliate with spreading white hairs 3 to 5 mm. long; basal leaves numerous, those of the culms 1 or 2, linear, 5 to 10 cm. long, 2 to 4 mm. wide, rather soft, becoming involute-setaceous, densely bearded at the throat with spreading white hairs, which equal or exceed those of the ligule, the upper surface pilose with long white hairs, the lower surface smooth or only slightly scabrous. Panicle somewhat exserted, about 6 mm. in diameter, pale, few-flowered; axis undulate, angular, scabro-pubescent, branches 2 mm. long or less; setae single or in pairs, green, flexuous, antrorsely scabrous, 2 to 5 mm. long. Spikelets oblong-ovate, acute, 3-nerved, barely 2 mm. long; first glume triangular-ovate, acute, 3-nerved, one-third as long as the spikelet; second glume broadly ovate, obtuse, apiculate, 5-nerved, two-thirds to three-fourths as long as the flowering glume; third glume equaling the flowering glume, 5-nerved, subtending a hyaline, lanceolate palea two-thirds its own length; flowering glume narrowly ovate, acute, apiculate, nearly smooth, striate and pitted below, not rugose, nearly smooth, shining at the apex, the inclosed palea broadly lanceolate, pitted, slightly convex for its whole length.

Mexico. Type specimen collected at Parras, State of Coahuila, Mexico, 1363 E. Palmer, June, 1880.

At once distinguished by its densely caespitose habit, narrow leaves, densely bearded ligule, and pilose sheath margin, and leaves.

\*\* *Panicle loose, interrupted; branches more or less elongated.*

† *Branches densely flowered.*

‡ *Setæ both antrorsely and retrorsely scabrous.*

17. **CHÆTOCHLOA ONURUS** (Griseb.) n. comb. *Setaria onurus* Griseb. Fl. Brit. W. Ind. 555 (1864). *Panicum onurum* Willd. in Herb., ex Griseb.

A stout, erect, glabrous perennial, 2 to 10 dm. high, with virgate, interrupted panicles and linear-lanceolate leaves, 1.5 to 4 dm. long. Culms glabrous, erect, simple or sparingly branched at the base, cylindrical; nodes glabrous; sheaths compressed, strigose-pubescent, sometimes slightly scabrous on the keel, the lower ones much longer than the internodes, imbricate, ciliate on the margins, bearded at the apex; ligule short, ciliate; leaf-blades 10 to 15 mm. wide, scabrous on both sides and on the cartilaginous margins, long-acuminate at the apex, tapering at the base, midvein prominent throughout. Panicle loose, cylindrical, 1 to 2 dm. long, 1.5 to 2 cm. in diameter; rachis striate, pilose; branches spreading-erect, the lower 1.5 to 2 cm. in length, scabrous, equaling or exceeding their internodes; setæ mostly solitary, rarely 2 or 3 at each spikelet, slender, flexuous, 1.5 to 2 cm. long, both antrorsely and retrorsely scabrous. Spikelets ovate-globose, acute, 2 mm. long; first glume one-third as long as the spikelet, triangular-cordate, acute, abruptly apiculate, 5-nerved; second glume one-half to two-thirds as long as the spikelet, broadly ovate, obtuse or truncate, apiculate, 9 to 11 nerved; third glume equaling the flowering glume, thin, 9-nerved, subtending an ovate hyaline palea nearly its own length; flowering glume ovate-globose, acute, generally abruptly apiculate, transversely undulate-striate below, smooth near the apex. Palea similar in markings, strongly convex.

West Indies, Mexico, South America.

SPECIMENS EXAMINED.—*Jamaica*: March, spikelets from specimens cited by Grisebach (Fl. Brit. W. Ind. 555) sent from Kew Herbarium, also specimen in the Gray Herbarium. *Cuba*: 3474 Wright 1860, 1864, 3887 Wright 1865; Cienguita, 264 Combs 1895.

In habit very much resembling *C. macrostachya*, but readily distinguished from this and other related forms by its 9 to 11 nerved second glume and both antrorsely and retrorsely scabrous setæ.

‡‡ *Setæ antrorsely scabrous only.*

§ *Leaves linear, glaucous.*

18. **Chætochloa composita** (H. B. K.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 39 (1897). *Setaria composita* H. B. K. Nov. Gen. & Sp. Pl. 1: 111 (1815). (Fig. 15.)

A pale, glaucous, caespitose perennial, 3 to 10 dm. high, much branched from the base, with long, linear leaves and cylindrical, dense, or more or less interrupted spike-like panicles 5 to 16 cm. long, 6 to 15 mm. in diameter, exclusive of the setæ. Culms geniculate at the base, subcompressed, scabrous and often pubescent, especially below the nodes, rarely glabrous, the innovations usually short and sterile; nodes bearded with a ring of silky, appressed hairs; sheaths striate, compressed, slightly scabrous on the keel above, and pilose at the apex, otherwise glabrous, the lower sometimes pubescent, mostly shorter than the internodes, ciliate on the margins; ligule very short, densely ciliate-fringed with silky hairs 1.5 to 3 mm. long; leaf-blades linear, plane, 1 to 2.5 dm. long, 2 to 5 mm. wide, glaucous, long, narrow, acuminate at the apex, scabrous on both sides or sometimes nearly glabrous, midvein prominent below, obscure above. Panicle pale green; rachis angular, striate, pilose; branches short, densely flowered, contiguous, crowded or sometimes rather remote, especially below; setæ single, rarely in pairs, green, flexuous, 5 to 15 mm. long, antrorsely scabrous.

Spikelets short-pedicellate, narrowly ovate, acute, 2 or rarely 3 mm. long; first glume acute or acuminate, 3-nerved, one-half as long as the spikelet; second glume broadly ovate, acute or apiculate, 5-nerved, nearly equaling the spikelet in length; third glume similar to the second, 5-nerved, equaling the flowering glume, subtending a lanceolate, hyaline palea; glumes pale, with prominent green nerves; flowering glume narrowly ovate, acute, short-apiculate, striate, nearly smooth, obscurely transversely wrinkled below, the inclosed palea similar in texture and markings, convex.

Colorado to Arizona, Texas, Mexico, and South America. June–October.

SPECIMENS EXAMINED.—

*Colorado*: Canyon City, 780 Jones 1878, 4 Eastwood 1892, 979 Shear 1896.

*Arizona*: No locality, Palmer 1869, Vasey 1889, 19, 21. Emersley 1890; Bisbee, 858, 926 Mearns 1892; Tucson, Pringle 1884, 805 Toumey 1892, 77 Toumey 1894; Gila Valley, 334 Rothrock 1874; Fort Verde, 939 McDougal 1891; Fort Huachuca, Wilcox 1894. *New Mexico*: No locality, 2094 Wright 1851–52; Mesilla, 60 Wootton 1897; Rincon, 41, 44a, 63 Jones 1884; Albuquerque, 85 Tracy 1887; Las Cruces, Vasey 1881; Mangos, Metcalfe 1897, Smith 1896. *Texas*: No locality, Nealley 1877; Western Texas, 799 Wright 1849; Maranillas, Havard 1883; Mesquite Bay, Ravenel 1869; Pinto Creek, Kinney Co., 83 Hall 1895; San Diego, Smith 1897; Painted Cave, Val Verde Co., 115 (in part) Nealley 1892. *Mexico*: Guaymas, 340 Palmer 1887; San Bernardino ranch, Mexican boundary, 746, 771,



FIG. 15.—*Chaetochloa composita*: spikelet showing seta, two views of the spikelet, and dorsal view of the flowering glume.

781 Mearns 1892; San Luis Mountains, 2101 Mearns 1893; White Water, 2313 Mearns 1893.

This common southwestern grass has been variously referred by American authors and collectors to *Setaria caudata* and *Setaria setosa*, but is at once distinguished from these species by its pale aspect, cylindrical panicle, long glaucous leaves, and long first and third glumes. *Setaria caudata* in Bul. No. 12, Div. Bot. U. S. Dept. Agr., "Grasses of the Southwest," pl. 5 (1891), and in "Bot. of Western Texas," Contr. U. S. Nat. Herb. 2: 510 (1894), *Chamæraphis caudata* in Beal Grasses of N. Am. 2:157 (1896).

§§ *Leaves linear-lanceolate, green.*

19. **CHÆTOCHLOA MACROSTACHYA**<sup>1</sup> (H. B. K.) n. comb. *Setaria macrostachya* H. B. K. Nov. Gen. & Sp. Pl. 1: 110 (1815). (Fig. 16.)

An erect or ascending perennial, 6 to 12 dm. high, with rather dense cylindrical panicles and linear-lanceolate leaves 1.5 to 5 dm. in length. Culms rather stout, compressed and more or less branched below, striate, scabrous below the nodes and panicle, otherwise smooth; nodes glabrous, sheaths loose, striate, glabrous, usually exceeding the internodes, scabrous on the keel, bearded at the apex, margins ciliate-fringed; ligule fringed with straight white hairs, 3 to 4 mm. long; leaf-blades rigid, linear-lanceolate, scarcely narrowed at the base, gradually tapering to the long acuminate apex, 1 to 1.5 cm. wide, scabrous on both sides or rarely nearly smooth, generally with a few long white hairs toward the base, midvein prominent throughout. Panicle pale green, strict, thyrsoid, cylindrical, usually tapering to the apex, 1 to 3 dm. long, 1 to 2 cm. in diameter; common axis angular, sparingly villous; branches short, contiguous, densely flowered, erect, exceeding their internodes, the lower generally slightly remote; setae solitary or in pairs, slender, flexuous, antrorsely scabrous, 1 to 2 cm. in length. Spikelets ovate-globose, about 2 mm. long, acute; first glume one-third to one-half as long as the spikelet, broadly ovate, obtuse, apiculate, 5 to 7 nerved; second glume two-thirds to three-fourths as long as the spikelet, broadly ovate, obtuse, apiculate, 5 to 7 nerved; third glume equaling the spikelet, slightly inclosing it by its infolded margins, sulcate, 5-nerved, subtending a lanceolate, hyaline palea about its own length; flowering glume strongly convex, apiculate, striate, and rather prominently transversely undulate-rugose, especially below, the inclosed palea equaling it in length, striate, nearly plane.

Texas to Mexico and South America.



FIG. 16.—*Chætochloa macrostachya*: a, spikelet showing the seta; b, c, views of the spikelet; d, flowering glume, dorsal view.

<sup>1</sup> *CHÆTOCHLOA AUSTRALIENSIS* sp. nov.

A stout, erect, or ascending grass, with lanceolate leaves and rather dense panicles 1.5 to 2 dm. long. Culms glabrous, except below the nodes and panicles; ligule

SPECIMENS EXAMINED.—*Texas*: Laredo, Havard 1884; no locality, Nealley 1887, 1888.

*Mexico*: Mirado, 362 Liebmann 1841, cited by Fourn. Mex. Pl. Enum. Gram. 45; Guaymas, 53 E. Palmer 1887; no locality, 378, 505, and 872 E. Palmer.

A distinct species, readily distinguished from *C. composita* (H. B. K.) Scribn. by its gibbous spikelets and broader, lanceolate leaves; and from other related species by its dense subcylindrical panicles.

20. **CHÆTOCHLOA RIGIDA** sp. nov.

An erect, rigid perennial, 3 to 6 dm. high, with loose, narrow, interrupted panicles, few short setæ, and rigid, lanceolate leaves 1 to 2.5 dm. long. Culms cylindrical, somewhat branching below, striate, smooth, scabro-pubescent below the panicles and sometimes below the glabrous nodes; sheaths mostly close, equaling or exceeding the nodes, glabrous, the lower ones imbricate and scarcely striate, margins very smooth, not ciliate; ligule very short, sparingly ciliate, not exceeding 1 mm. in length; leaf-blades rigid, 6 to 12 mm. wide, minutely scabrous on both sides or nearly smooth, often minutely pubescent at the throat, serrulate-scabrous on the margins, narrowed at the base, acuminate, sometimes somewhat involute-setaceous above, midnerve very prominent on the lower side of the leaf for two-thirds its length, glabrous. Panicle 0.5 to 2 dm. long, strict, often scarcely exerted from the upper sheath, pale or straw-colored; rachis angular, short pubescent or somewhat villous, undulate; branches very short or nearly obsolete, the lower not exceeding 1 cm., erect; setæ solitary, often nearly obsolete, stout, flexuous, 3 to 10 mm. long. Spikelets 2 to 2.5 mm. long, ovate, acute; first glume about one-half as long as the spikelet, acute, 3-nerved, the midnerve excurrent, the lateral ones anastomosing with it; second glume one-half to two-thirds as long as the spikelet, 5 to 7 nerved, broadly ovate, acute, apiculate; third glume equaling the flowering glume and slightly inclosing it with its infolded margins, 5-nerved, sulcate, subtending a lanceolate, hyaline palea two-thirds its own length; flowering glume ovate, acute, apiculate, obscurely keeled, striate, transversely undulate-rugose below, nearly smooth and glossy at the apex, the inclosed palea similar in markings and texture, nearly plane.

Lower California. September–February.

SPECIMENS EXAMINED.—*Lower California*: La Paz, 125 E. Palmer 1890 (type); Carmen Island, 857 Palmer 1890; San José del Cabo, 28 Brandegee 1890.

All these plants were distributed under the names of *Setaria caudata* and *S. setosa*, from both of which this species is very distinct. Readily distinguished by its rigid culms, smooth sheaths, narrow, straw-colored panicles, and few, usually very short, setæ. Related to *C. macrostachya*.

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densely bearded with stiff hairs; leaves 2 to 3 dm. long, 1.5 to 2 cm. wide; nodes smooth. Panicle about 2 cm. in diameter; rachis scabrous, sparingly villous; setæ solitary, erect-spreading, 1 to 1.5 cm. long. Spikelets 3 mm. long, narrowly ovate, acute; first glume one-third to one-half as long as the spikelet, acute, 3 to 5-nerved; second glume four-fifths as long as the spikelet, acute, apiculate, 7-nerved, nerves prominent; third glume equaling the spikelet, 5-nerved, subtending a broad-lanceolate, hyaline palea its own length; flowering glume acute, apiculate, strongly transversely undulate-rugose below, nearly smooth at the apex, the inclosed palea striate. In the specimen examined the flowering glume has a prominent hippocrepiform scar at the base.

Australia.

A species previously referred to *C. macrostachya* (H. B. K.), but from which it is at once distinguished by its thicker panicles, broader leaves, narrowly ovate, larger spikelets, and more strongly rugose flowering glume.



†† *Branches loosely flowered.*

‡ *Flowering glume strongly transversely undulate-rugose.*

§ *Leaves pilose.*

21. **Chaetochloa latifolia** Scribn. U. S. Dept. Agr., Div. Agros. Bul. 11: 44, pl. 3 (1898). (Fig. 17.)

"A branching annual, 2 to 4 dm. high, with compressed sheaths, rather broad, flat leaves, and bristly panicles 4 to 8 cm. long. Culms compressed, slightly scabrous, and short bearded at the nodes; sheaths striate, scabrous, especially along the keel, papillate-pilose, villous on the overlapping margin; ligule very short and densely ciliate-fringed with stiff hairs; leaf-blades broadly lanceolate, cordate at the base, very acute, 5 to 6 cm. long, 1 to 2 cm. broad, scabrous on both sides and especially along the narrow, cartilaginous margins, strongly pilose above and below. Branches of the panicle very short, slightly crowded; setae 12 to 18 mm. long, strongly antrorsely scabrous. Spikelets obovate, about 2 mm. long; first glume less than 1 mm. in length, 3-nerved; second glume shorter than the flowering glume, 5-nerved; outer glumes all obtuse, the third one empty; flowering or fruiting glume about 2 mm. long, strongly convex and deeply transversely rugose excepting near the slightly apiculate apex. Palea transversely rugose and similar in texture to the flowering glume.

"Growing under bushes in deep ravines, Durango, Mexico, 879 E. Palmer 1896.

"This species is well marked by its comparatively short and broad leaves, which are cordate at the base, and long, widely spreading bristles."

**CHÆTOCHLOA LATIFOLIA BREVISSETA** var. nov.

A more slender form, with narrower, less pubescent leaves, which do not exceed 1 cm. in width, narrower, few-flowered panicles, and short appressed setae. Mexico.

SPECIMENS EXAMINED.—*Mexico*: Oaxaca, 347 Conzatti & Gonzalez 1897; no locality, 470 Palmer 1896.

§§ *Leaves scabrous.*

22. **CHÆTOCHLOA LIEBMANNI** (Fourn.) n. comb. *Setaria liebmanni* Fourn. Mex. Pl. Enum. Gram. 44 (1886).

An erect, glabrous, yellowish-green annual, 3 to 9 dm. high, with broad, flat, soft leaves and loose, lanceolate panicles 1 to 2.5 dm. in length, 2 to 4 cm. in diameter. Culms erect, simple, or sometimes sparingly branched from the base, glabrous, straw colored; nodes glabrous or the lower ones with few appressed hairs; sheaths striate, loose, very glabrous, equaling or slightly exceeding the internodes, the margins cartilaginous, ciliate-fringed with short hairs; ligule short, densely ciliate-fringed with stiff white hairs about 1 mm. long. Leaf-blades lanceolate, somewhat narrowed at the cordate base, long acuminate-pointed, 1 to 3 dm. long, 1.5 to 2 cm. wide, thin, pale, scabrous on both sides and especially on the cartilaginous margins, midvein very prominent below, obscure above. Panicle attenuate at both ends, the axis slender, channeled, scabrous; branches approximate, erect-spreading, scabrous, slender, loosely few-flowered, 1.5 to 3 cm. long, much exceeding the internodes, not remote at the base; setae one at the base of each spikelet, slender, flexuous, finely antrorsely scabrous, 10 to 15 mm. in length. Spikelets ovate, acute, 2 mm. long, pale, sometimes tinged with purple; first glume cordate, inclosing the base of the spikelet, acute, 3-nerved, one-third as long as the spikelet; second and third glumes broadly ovate, acute, 5 to 7 nerved, the second four-fifths as long as the spikelet, the third slightly exceeding the flowering glume, nerves green, prominent; flowering glume about 2 mm. long, ovate, acute, short-apiculate, strongly convex, striate, very strongly transversely undulate-rugose except near the apex; palea similar in texture and markings to the flowering glume.



FIG. 17.—*Chætochloa latifolia*: a, spikelet showing the seta; b, c, views of the spikelet; d, flowering glume, dorsal view.

In thickets, Mexico. July–October.

**SPECIMENS EXAMINED.**—*Mexico*: Southwestern Chihuahua, 52 (in part) E. Palmer 1885; E. Palmer 1876; no locality, 233 Palmer 1897; Colima, 142 E. Palmer 1897; Oaxaca, 2788 Nelson 1895; Batopilas, 52, 110a Palmer 1885.

Readily distinguished by its yellowish-green color, broad, lanceolate, thin leaves, loose panicles, the branches not remote at the base, and its very strongly rugose flowering glumes.

**CHÆTOCHLOA LIEBMANNI PAUCIFLORA** (Vasey) n. comb. *Chamæraphis caudata pauciflora* Vasey in Beal Grasses of N. Am. 2: 158 (1896).

A very slender form, 1 to 4 dm. high, with much smaller, narrow panicles 1 cm. in diameter, 5 to 10 cm. long, the branches not exceeding 1 cm. in length or obsolete, and smaller leaves 5 to 10 cm. long, 3 to 10 mm. broad. Spikelets as in the type.

Mexico and Lower California.

**SPECIMENS EXAMINED.**—*Mexico*: Southwestern Chihuahua, 52 (in part) Palmer 1885; Guaymas, 191 Palmer 1887; Alamos, 686 Palmer 1890. *Lower California*: San José del Cabo, 12 Brandegee 1890.

In habit very much resembling *Chætochloa grisebachii* (Fourn.), but at once distinguished by its very strongly rugose flowering glumes. *Chamæraphis caudata* (Lam.) Beal, Grasses of N. Am. 2: 157, to which this form was wrongly referred as a variety, is not true *Panicum caudatum* Lam., but *Chætochloa composita* (H. B. K.), to which the above is not closely related.

†† Flowering glume smooth or finely transversely wrinkled.

§ Spikelets 3 mm. long.

23. **CHÆTOCHLOA MACROSPERMA** sp. nov. *Setaria composita* of Chapman's Fl. So. U. S. and of Bul. 7: 85. fig. 67, U. S. Dept. Agr., Div. Agros., not of H. B. K. (Fig. 18.)

A very smooth, stout perennial, 6 to 12 dm. high, with broad, flat leaves and branching, bristly panicles 10 to 25 cm. long. Culms cylindrical, robust, geniculate at the base, glabrous; nodes smooth, sheaths compressed, striate, glabrous, the lower exceeding, the upper shorter than, their internodes, margins ciliate; ligule short, densely ciliate-fringed with long white hairs; leaf-blades linear-lanceolate, 1 to 3 dm. long, 10 to 20 mm. wide, somewhat narrowed at the base, and long slender acuminate at the apex, scabrous on both sides or sometimes nearly glabrous; margins cartilaginous, serrate-scabrous, midvein prominent below. Panicle linear-ovate in outline, 2 to 4 cm. in diameter exclusive of the awns;



FIG. 18.—*Chætochloa macrosperma*: a, b, views of the spikelet; c, spikelet showing the setæ.

rachis angular, striate, sparingly villous; branches erect-spreading, the lower ones 1.5 to 3 cm. long, loosely flowered; setae solitary, 1.5 to 3 cm. long, green, somewhat flexuous, antrorsely scabrous. Spikelets short pedicellate, narrowly ovate, acute, 3 mm. long; first glume cordate, acute, inclosing the base of the spikelet; second glume, oval, acute, short apiculate, 5 or rarely 7 nerved, three-fourths the spikelet in length; third glume 5-nerved, equaling the spikelet, slightly inclosing the flowering glume by its infolded edges, subtending a lanceolate, hyaline palea; flowering glume narrowly ovate, acute, striate, finely transversely undulate wrinkled, its palea similar in markings and texture, slightly convex at the base.

Shell islands and keys, sometimes in old fields. Florida, Texas. July–October.

SPECIMENS EXAMINED.—*Florida*: Mouth of the St. Johns River, 3617 Curtiss; Key Largo, 5502 Curtiss 1895; Caloosa River, 41 Garber 1878; Orange Co., 29 Baker 1897; Weston Key, 263 Simpson 1891; Grasmere, 1150 Combs and Rolfs 1898; Cedar Key, 969 Combs 1898; Homosassa, 977 Combs 1898; Crystal, 979½ Combs. 1898. *Texas*: Rio Grande, Wright 1848.

24. **CHÆTOCHLOA VILLOSISSIMA** sp. nov. (Fig. 19.)

An erect, somewhat caespitose more or less densely villous-pubescent perennial, 4 to 10 dm. high, with broad-linear or linear-lanceolate leaves and loose, lanceolate panicles about 2 dm. in length. Culms branching and usually somewhat geniculate at the base, compressed, striate, glabrous; nodes smooth or sparingly bearded with appressed hairs; sheaths loose, striate, compressed, equaling



FIG. 19.—*Chaetochloa villosissima*: a, spikelet showing the setae; b, c, views of the spikelet; d, flowering glume, dorsal view.

or exceeding the internodes, scabrous above, especially on the keel, nearly smooth below, more or less densely villous-pubescent above, bearded at the apex and ciliate-pubescent on the margins; ligule brown, about 1 mm. long, densely ciliate-fringed with long white hairs; leaf-blades broad-linear, 1.5 to 3 dm. long, 6 to 8 mm. wide, tapering toward the base, long-acuminate at the apex, more or less densely villous-pubescent on both sides, with spreading white hairs, serrulate-scabrous on the cartilaginous margins, midvein prominent on the lower surface for its whole length. Panicle about 2 dm. long, 2 to 3 cm. in diameter below, tapering to the apex, loose; rachis angular striate, scabrous, villous; branches

slender, spreading-erect, the lower 2 to 3 cm. long, few-flowered, much exceeding their internodes; setae solitary, green, slender, somewhat flexuous, antrorsely scabrous, 1.5 to 2.5 cm. in length. Spikelets lanceolate-ovate, acute, 2.5 to 3 mm. long, pale green; first glume one-third as long as the spikelet, broadly ovate, acute, 3-nerved, somewhat inclosing the base of the spikelet; second glume nearly equaling the flowering glume, ovate, acute, short apiculate, 5 to 7 nerved, the midnerve excurrent, the lateral ones abruptly vanishing in the hyaline margins or anastomosing; third glume equaling the flowering glume, 5-nerved, apiculate, slightly sulcate and inclosing the flowering glume with its infolded margins subtending a very short lanceolate, hyaline palea about one-fifth its own length; flowering glume lanceolate-ovate, acute, abruptly short-apiculate at the incurved tip, rather finely transversely undulate-rugose below, striate and punctate above, the inclosed palea narrow, plane, similar in texture and markings.

Type specimen collected by J. G. Smith at San Diego, Tex., May, 1897. Limpia Canyon, Presidio Co., 115 (in part) Nealley 1892, a smaller undeveloped specimen, with much less pubescent leaves, otherwise as in the type.

A very distinct species, at once distinguished from *C. macrostachya* (H. B. K.) Scribn. and *C. composita* (H. B. K.) Scribn. by its loose, open panicle, larger spikelets, and narrow pubescent leaves, and from *C. macrosperma* by its more open panicle and narrow pubescent leaves.

§ § Spikelets less than 3 mm. long.

† Flowering glume pitted or striate.

25. *Chaetochloa grisebachii* (Fourn.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 39 (1897). *Setaria grisebachii* Fourn. Mex. Pl. Enum. Gram. 45 (1886). (Fig. 20.)

A smooth, slender, caespitose annual, 1.5 to 8 dm. high, with loose, compressed sheaths, short, lanceolate leaves and loose, bristly, panicles 3 to 12 cm. long. Culms branching at the base, very slender, glabrous, generally somewhat geniculate below; nodes bearded with short appressed hairs; sheaths shorter than the internodes, striate, open at the throat, scabrous, sparingly strigose-pubescent, margins ciliate; ligule short, densely ciliate-fringed; leaf-blades lanceolate, slightly narrowed at the cordate base, acuminate, 5 to 10 cm. long, 5 to 10 mm.



FIG. 20.—*Chaetochloa grisebachii*: a, b, c, views of the spikelet; d, flowering glume, dorsal view.

wide, scabrous and sparingly short pubescent on both sides, midvein prominent below, becoming obsolete above. Axis of the inflorescence angular, pilose, branches very short, appressed, few-flowered, the lower remote; setae single or in pairs, somewhat flexuous, widely spreading, purple or sometimes green, 5 to 15 mm. long. Spikelets ovate, acute, 2 mm. long; first glume broadly cordate, inclosing the base of the spikelet, acute, 3-nerved, one-third as long as the spikelet; second glume obtuse, 5 to 7 nerved, nearly equaling the spikelet in length and closely enveloping it; third glume obtuse, 5-nerved, slightly exceeding the flowering glume in length, sulcate, subtending a short hyaline palea; nerves in

all the glumes green, prominent; flowering glume nearly 2 mm. long, ovate, acute, nearly smooth, striate, and very finely transversely wrinkled below.

Texas to Arizona. Mexico.

**SPECIMENS EXAMINED.**—*Texas*: Austin, Hall 1872; no locality, Nealley 1888; Kerrville, Smith 1897; Heller 1894; Limpia Canyon, Presidio Co., 130 Nealley 1892; Smith 1897; Val Verde, Nealley 1890. *New Mexico*: 2096 Wright 1851–52, and 800 Wright 1849, no locality; Mangos, Smith 1897. *Arizona*: Bowie, 4288 Jones 1884; Camp Crittenden, Rothrock 1874; Beaver Creek, 606 McDougal 1891; Clear Creek, 78 Toumey 1891. *Mexico*: City of Mexico, 3040, 3153 Holway 1898; Rio Honda, Holway 1896; Chihuahua, 381 Pringle 1885; San Luis Potosi, 957 Parry & Palmer 1878; Oaxaca, 4937 Pringle 1894; no locality, 716 Palmer 1896, 1043 Schaffner 1876, 441 Bourgeau 1863–1866; Guanajuato, Dugès 1894.

No. 441 Bourgeau, represented in the Gray Herbarium, is cited by Fournier in the original description as one of the type specimens on which this species is based.



FIG. 21.—*Chaetochloa grisebachii ampla*: a, spikelet showing the seta; b, c, views of the spikelet; d, flowering glume, dorsal view.

**CHÆTOCHLOA GRISEBACHII AMPLA** var. nov. (Fig. 21.)

A very robust form, 5 to 8 dm. high, with thicker culms, longer leaves, and long open panicles; leaves lanceolate, 1 to 2 dm. in length, 10 to 15 mm. wide; panicle loose, 12 to 18 cm. long, 2 to 5 cm. in diameter, the branches spreading, much longer than the internodes, the lower 2 to 3.5 cm. in length.

New Mexico; Mexico.

**SPECIMENS EXAMINED.**—*New Mexico*: Organ Mountains, Vasey 1881; no locality, 994 Fendler 1847. *Mexico*: no locality, 4670 Pringle 1896; San Bernardino ranch,

Mexican boundary, 2000 Mearns 1893; no locality, 728 Palmer 1896; Oaxaca, 344 Conzatti & Gonzalez 1897.

Readily distinguished from the type by its larger size and elongated, spreading branches of the panicle.

**CHÆTOCHLOA GRISEBACHII MEXICANA** var. nov. *Setaria mexicana* Schaffner in Herb.

A densely caespitose form, 6 to 10 cm. high, with interrupted panicles 1 to 3 cm. long and short leaves 2 to 3 cm. in length. Spikelets as in the type.

San Luis Potosi, 1044 Schaffner 1876; Schaffner, Sept., 1877.

† Flowering glume finely transversely wrinkled.

= Panicle obtuse at the apex.

26. **CHÆTOCHLOA POLYSTACHYA** (Scheele) n. comb. *Setaria polystachya* Scheele, Linnæa 22: 339 (1849). (Fig. 22.)

A stout, erect perennial, 6 to 12 dm. high, with compressed culms, lanceolate leaves, and loose elongated panicles 1 to 2 dm. in length. Culms cylindrical or subcompressed, branching at the base, geniculate, glabrous or slightly scabrous below the nodes and panicle; nodes brown, bearded with short appressed hairs; sheaths striate, glabrous or slightly pubescent above, bearded at the apex, margins ciliate, the lower ones subcompressed, more or less scabrous on the keel; ligule short, ciliate-fringed; leaf-blades 1.5 to 3 dm. long, 1.5 to 2 cm. wide, abruptly narrowed at the base, acuminate, scabrous on both sides and especially so on the cartilaginous margins, the lower ones often more or less strigose-pubescent, midvein prominent below, becoming obsolete above. Panicle pale green, lanceolate, lax, 1.5 to 2.5 dm. long, 1.5 to 3 cm. in diameter; rachis angular, pilose, branches slender, 1.5 to 3 cm. long, erect-spreading, much exceeding their internodes; setæ solitary, 8 to 12 mm. long, green, slender, flexuous, antrorsely scabrous. Spikelets narrowly ovate, acute, 2 mm. long; first glume about one-third as long as the spikelet, slightly inflated, triangular-cordate, acute, 3-nerved; second glume two-thirds as long as the spikelet, acute, 5-nerved, the midnerve excurrent, the lateral ones anastomosing with it; third glume equaling the flowering glume, slightly sulcate, acute, 5-nerved, sub-



FIG. 22.—*Chætochloa polystachya*: a, spikelet showing the seta; b, c, views of the spikelet; d, flowering glume, dorsal view.

tending a linear-lanceolate, hyaline palea; flowering glume narrowly ovate, acute, short-apiculate, striate, quite strongly transversely undulate-rugose below, striate or pitted at the apex, the inclosed palea narrowly ovate, slightly convex at the base, plane above, striate.

Dry soil, in thickets, etc., Texas. July–October.

**SPECIMENS EXAMINED.**—*Texas*: Reverchon 1885; Nealley 1888; 164, 564 Lindheimer 1846; 357 Lindheimer 1845; Kerrville, Smith 1897; Gillespie Co., 783 Jermy; Mouth of Pecos River, 34 Havard 1883.



FIG. 23.—*Chætochloa caudata*: a, branch showing spikelet and setæ; b, view of the spikelet; c, flowering glume, dorsal view.

flexuous, angular, pilose; branches very short, not exceeding 5 mm., or obsolete; setæ solitary, flexuous, 4 to 10 mm. long, antrorsely scabrous, sometimes somewhat pilose below. Spikelets ovate, acute, short-pedicellate; first glume nearly one-half as long as the spikelet, ovate, acute, 5-nerved; second glume two-thirds the length of the spikelet, broadly ovate, acute, short apiculate, 5 to 7 nerved; third glume equaling the spikelet, 5-nerved; flowering glume ovate, acute, short apiculate, striate, transversely undulate-rugose below, smooth at the apex.

New Jersey, Alabama, and Florida, West Indies, Mexico, South America.

**SPECIMENS EXAMINED.**—*New Jersey*: Camden, Martindale 1879, on "ballast." *Alabama*: Mobile, Mohr 1891, on "ballast." *Florida*: Key West, Blodgett. *West Indies*: St. Croix, 67 Ricksecker 1895.

= = Panicle long-attenuate at the apex.

**27. *Chætochloa caudata*** (Lam.) Scribn. Rept. Mo. Bot. Gard. 10: 52 (1899). *Panicum caudatum* Lam. Illus. 1: 171 (1791). *Setaria caudata* R. & S. Syst. 2: 495 (1817). (Fig. 23.)

A very slender, somewhat caespitose annual 3 to 6 dm. high, with elongated, interrupted panicles and narrow, linear leaves 1 to 2.5 dm. in length. Culms much branched from the base, geniculate, glabrous, cylindrical, very slender; nodes smooth; sheaths about equaling the internodes, pubescent, ciliate on the margins; ligule short, ciliate. Leaf-blades linear, 1 to 2.5 dm. long, 3 to 5 mm. wide, pubescent on both sides, slightly scabrous on the midvein and margins, long filiform-attenuate at the apex, the upper ones generally equaling or exceeding the culms. Panicles 5 to 15 cm. long, attenuate, few-flowered; rachis slender,



The specimen from New Jersey is depauperate, being but slightly over 1 dm. high and densely caespitose.

28. *Chaetochloa setosa* (Sw.) Scribn. U. S. Dept. Agr., Div. Agros. Bul. 4: 37 (1897). *Panicum setosum* Swartz, Prod. Veg. Ind. Occ. 22 (1788). *Setaria setosa* Beauv. Agrost. 51 (1812). *Chamaeraphis setosa* Kuntze Rev. Gen. Pl. 2: 769 (1891). (Fig. 24.)

An erect branching perennial, 4 to 7 dm. high, with loose, slender, generally long-attenuate panicles 1 to 2.5 dm. in length and linear-lanceolate, pubescent leaves

1 to 2 dm. long. Culms rather slender, glabrous, geniculate at the base, cylindrical or subcompressed, sometimes rooting at the lower nodes; nodes glabrous; sheaths generally equaling or longer than the internodes, loose, striate, nearly smooth at the base, more or less pubescent toward the apex, ciliate on the margins; ligule very short, ciliate; leaf-blades linear-lanceolate, about 1 cm. broad, acuminate, rounded at the base, scabrous on the cartilaginous margins. Panicle lax, attenuate, 1 to 2 cm. in diameter; axis angular, pilose; branches slender, few-flowered, 1 to 2.5 cm. in length, equaling or exceeding the internodes; setae 1 to 3 at each spikelet, slender, flexuous, scabrous, 10 to 15 mm. long; spikelets 2 mm. long, elliptical-ovate, acute; first glume about one-half the length of the spikelet, acute or acuminate, 3-nerved; second glume nearly equaling the spikelet, ovate, acute, abruptly apiculate, 5-nerved; third glume



FIG. 24.—*Chaetochloa setosa*: a, spikelet showing setae; b, c, views of the spikelet; d, flowering glume, dorsal view.

equaling the fourth, 5-nerved, subtending a hyaline palea which nearly equals the flowering glume in length; flowering glume about 2 mm. long, narrowly ovate, acute or acuminate, finely transversely rugose, especially below. Palea similar in markings and texture, equaling the glume in length.

New Jersey, New Mexico, West Indies, Mexico, South America.

SPECIMENS EXAMINED.—*New Jersey*: Camden, Parker 1879, on "ballast;" also collected by Martindale, no date. *New Mexico*: Organ Mountains, 438 Wooton 1897. *West Indies*: Kingston, Jamaica; Alexander 1853; March 1886, no locality; spikelets from specimen in Kew Herbarium, cited by Grisebach Fl. Brit. W. Ind. 555; same

also in the Gray Herbarium, Cambridge; St. Croix, Eggers 1876; St. Thomas, Eggers 1876 and 1890; Gordon Town, 829 Hart 1886. *Mexico*: Monterey, Nuevo Leon, 1968 Pringle 1888.

The specimen from New Mexico, 438 Wooton 1897, is not typical and differs from the other specimens cited in having the sheaths somewhat compressed, slightly keeled, the setae longer, and the panicle obtuse at the apex, not long-attenuate. In H. B. K. Nov. Gen. & Sp. Pl. 1: 110 (1815) this species is cited as a synonym of *Setaria macrostachya*, but from a careful comparison of the original descriptions, authentic specimens, and the literature on the subject they appear to be very distinct. Nees<sup>1</sup> says that Swartz's specimens, which he has seen in the Schreber Herbarium, differ from *S. macrostachya* H. B. K. in having the second glume 5-nerved, narrower, pubescent leaves, and lax, elongated, and attenuated panicles. Trinius<sup>2</sup> says that the details of *Panicum setosum*<sup>3</sup> do not belong to this species, but to *P. onurum*, which has been confounded with it; hence the confusion regarding this species.

#### NORTH AMERICAN GRASSES WHICH HAVE BEEN WRONGLY REFERRED TO THE GENUS CHÆTOCHLOA (SETARIA).

- Setaria auriculata* Fourn. Mex. Pl. Enum. Gram. 43 (1886) = *Setariopsis auriculata* (Fourn.) Scribn.  
*Setaria cirrhosa* Fourn. Mex. Pl. Enum. Gram. 43 (1886) = *Panicum cirrhosum* (Fourn.) n. comb.  
*Setaria effusa* (Fourn.) Mex. Pl. Enum. Gram. 42 (1886) = *Panicum mexicanum* nom. nov.  
*Setaria jurgensenii* Fourn. Mex. Pl. Enum. Gram. 42 (1886) = *Panicum jurgensenii* (Fourn.) n. comb.  
*Setaria latiglumis* Vasey Bul. Torr. Bot. Club. 13: 229 (1886) = *Setariopsis latiglumis* (Vasey) Scribn.  
*Setaria paniculifera* (Steud.) Fourn. Mex. Pl. Enum. Gram. 42 (1886) = *Panicum paniculiferum* Steud. Syn. Gram. 54. 1855.  
*Setaria pauciseta* Vasey Bul. Torr. Bot. Club 13: 230 (1886) = *Setariopsis auriculata* (Fourn.) Scribn.  
*Setaria schiedeana* (Schlecht.) Fourn. Mex. Pl. Enum. Gram. 43 (1886) = *Ixophorus schiedeana* Schlecht. Linnæa 31: 421 (1861).  
*Setaria sulcata* Raddi Agrost. Bras. 50 = *Panicum sulcatum* Aubl.  
*Setaria uniseta* (Presl) Fourn. Mex. Pl. Enum. Gram. 43 (1886) = *Ixophorus unisetus* Schlecht. Linnæa 31: 421 (1861).  
*Chamæraphis uniseta* of Beal's Grasses of N. Am. 2: 158 (1896) is *Chætochloa grisebachii*.

#### DOUBTFUL AND UNKNOWN SPECIES CREDITED TO NORTH AMERICA.

- Setaria affinis* Schrad. in R. & S. Mant. 2: 276 (1824), Described by Muhlenberg in Desc. Gram. 101 (1817) without name = (?) *Chætochloa corrugata parviflora*. Southern States.  
*Setaria ambigua* Schrad. Linnæa 12: 430 (1838). Type material collected in Texas = (?) *Chætochloa imberbis geniculata*.  
*Setaria biconvexa* Grisebach Fl. Brit. W. Ind. 555 (1864). Scarcely distinct from *C. onurus*. Spikelets from Grisebach's type specimen sent from Kew Herbarium agree almost perfectly with those of *C. onurus*. *S. biconvexa* is described as having the second glume 7-nerved as a distinguishing character from the 9 to 11 nerved second glume of *S. onurus*, but the spikelets from Grisebach's type have the second glume 9-nerved!

<sup>1</sup> Agrost. Bras. 2: 246.

<sup>2</sup> Mem. Acad. Sci. St. Petersburg., ser. 6, 3: 138, 139.

<sup>3</sup> Trin. Icon. t. 95.

- Setaria californica** Kellogg Proc. Cal. Acad. Sci. 1: 26 (1873). Collected at Shasta, on the Sacramento River, and described as being about 12 feet high, with erect, cylindrical spikes a foot long, with densely villous rachis, and smooth flowering glume. From the description and the fact that this prominent form has not been collected since, there can be little doubt that it was a form of *Chaetochloa italica*, escaped from cultivation but not persisting.
- Setaria falcifolia** Fourn. Mex. Pl. Enum. Gram. 44 (1886). Mexico.
- Setaria flava** Kunth, Rev. Gram. 1: 46 (1829). Described from South American material and credited by Fournier to Mexico. No specimens have been seen which agree with Kunth's description, and the specimens cited by Fournier (231 Bourgeau and 30 Liebmann), which were examined, are referable to *C. purpurascens*.
- Setaria laevis** Fourn. Mex. Pl. Enum. Gram. 45 (1886). Mexico.
- Setaria pseudoverticillata** Fourn. Mex. Pl. Enum., 45 (1886). Mexico.
- Setaria rariflora** Presl Rel. Hænk. 1: 313 (1830). Mexico.
- Setaria semirugosa** Kunth Enum. Pl. 1: 152 (1833). Described from South American material and credited by Fournier to Mexico. No specimens seen from North America.
- Setaria stipæculmis** C. Mueller Bot. Zeit. 19: 323 (1861). This is certainly not a *Setaria*, as is very evident from the original description. Texas.
- Setaria vulpiseta** R. & S. Syst. 2: 495 (1817). Credited by Grisebach to the West Indies. No specimens seen. Fournier (Mex. Pl. Enum. Gram. 45) says that the specimens referred by Grisebach to *S. vulpiseta* are *S. macrostachya* H. B. K.



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